

Rock Products

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Number 7

Few Men Needed at This Stone and Lime Plant

With a Crew of 26 Men, the Thomasville Stone and Lime Co., Thomasville, Pa., Produces 1500 Tons of Crushed Stone and 125 Tons of Lime Per Day

THE operation of the Thomasville Stone and Lime Co., eight miles south of York, Pa., is an example of a really economically operated crushed stone and lime producing plant. At this plant the company has established and maintained the record of quarrying and shipping 1500 tons of crushed limestone, together with 125 tons of lump lime, in a single 10-hr. day with a total of 26 men.

Producing this amount of stone and lime with such a relatively small number of men is made possible because the company uses machinery instead of men wherever possible.

This policy is carried out in the entire operation from the stripping and drilling to the loading of the cars.

Most interesting of all is the method of quarrying and stripping, and the quarry trackage system. The quarry face which is opened to a length of approximately 1200 ft., is 60 ft. in height, and has an average depth of overburden of 4 ft. As the top of the stone is rough and has pockets, the stripping is done by a $\frac{3}{4}$ -yd. clam-shell bucket mounted on an Erie type B steam shovel.

This method of removing the overburden

received much criticism from other operators at the time it was adopted. Several months use, however, has proven it to be efficient and unusually economical, for with three men the company claims that it strips from 2000 to 2500 tons per day. Before the clam shell was put into service, a steam shovel with an excavator dipper was used which required a larger force of men and the tonnage stripped was less than one-half the present capacity.

Drilling is accomplished by two well drills which are powered by gasoline. All blasting is supervised by one man, who also



Simple track arrangement and use of small power shovels keep quarry operating costs low at this operation



By having the primary breaker and scalping screen in the quarry the haul is shortened, resulting in greater speed of the entire operation

lays out the holes. By having one man to attend to this phase of the operation the company's drilling and blasting costs are reduced to a minimum.

Stone is loaded by three Erie Type B. steam shovels with $\frac{3}{4}$ -yd. dippers. The company has found that by using one model of shovel, the upkeep is comparatively lower than that entailed by using various sizes and makes. A particular advantage is that repair parts are interchangeable, so that a complete stock of duplicate parts for only one machine is necessary.

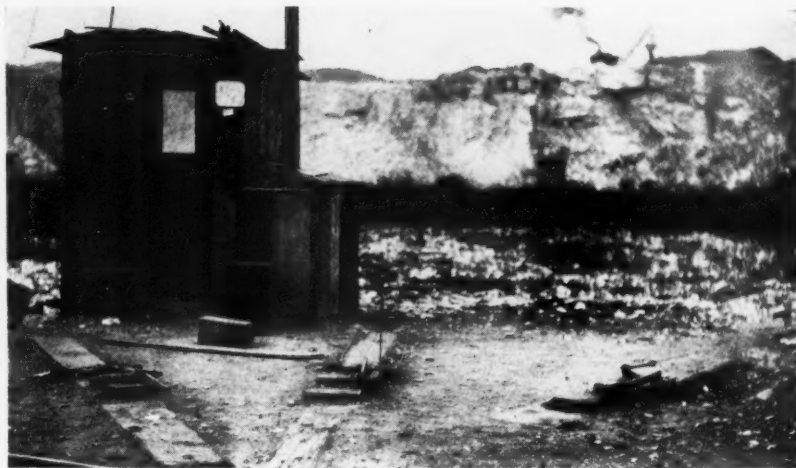
Quarry transportation is effected by four 12-ton saddle-tank locomotives, each handling a train of four 4-yd. Kuppel cars.

A main line track from the crushing unit covers a circling route to the quarry and extends the full length of the face. From the main line a spur of track leads to each of the three shovels and as the main track

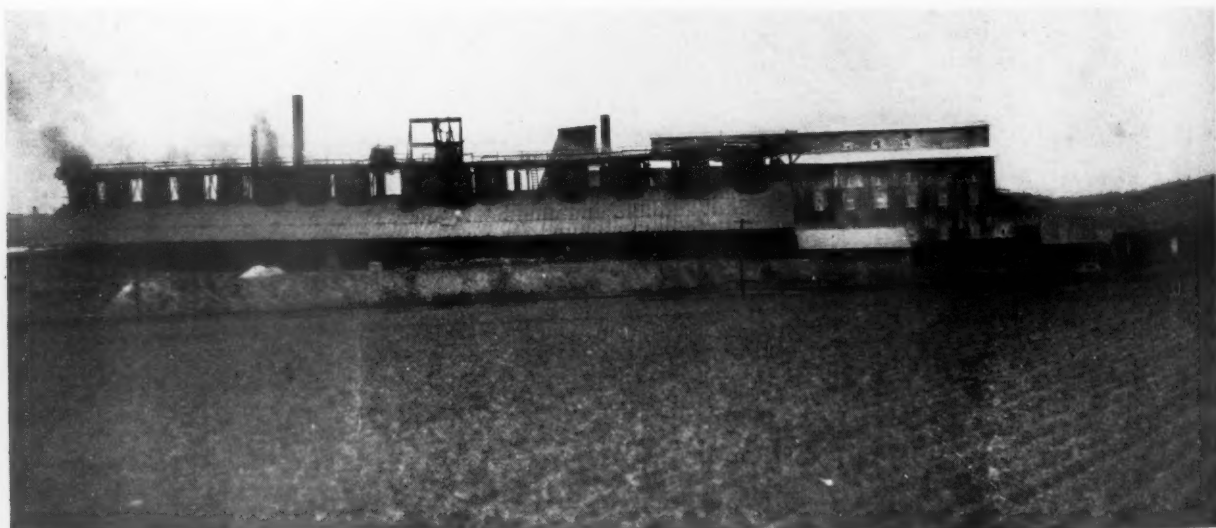
leads direct to the crushing plant, there are therefore but three switches in the entire system. These switches are controlled from one point by one man whose duty it is to fasten the cable to the cars at the foot of the incline. Two heavy-gage wires extend from each switch to the control point where they are connected to a lever. By throwing the lever, the switch is opened or closed as desired.

The switches are several hundred feet apart and their distances from the control levers vary from 400 to 600 ft. The wire expansion is taken care of by turnbuckles.

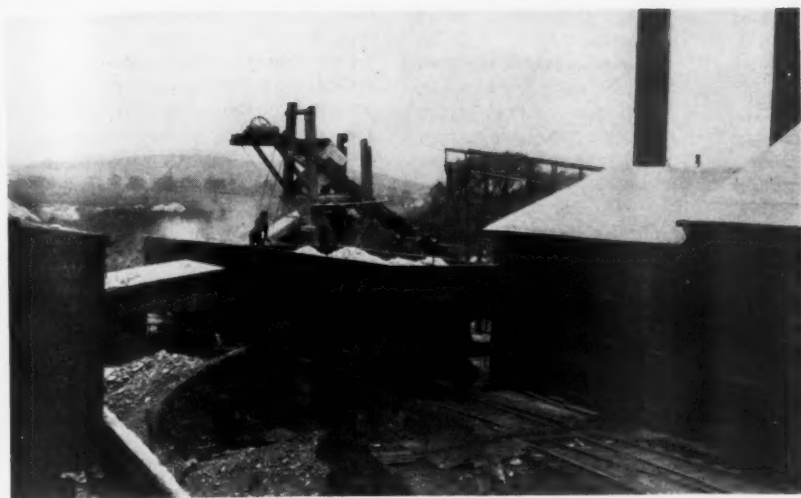
This example of system and economy has reduced the company's operating costs in the quarry approximately 15 per cent. It not only does away with the services of two or more men, but also eliminates the usual stopping of engines while switches are being thrown, thus permitting the entire operation to function faster and more systematically.



The three levers mounted on the embedded ties control the switches in the quarry



This battery of kilns produces more than 125 tons of lime daily. The building at the right houses the sizing screens and steel storage tanks



Loading a car with flux stone. The tipple leads direct from the scalping screen in the quarry

As the loaded cars are brought from the quarry they are placed on a storage track at the foot of the short incline leading to the crusher. The locomotive cuts loose from the train of loads and returns to the quarry with a train of empties taken from a storage track laid for that purpose at the foot of the incline.

The main breaker, a 40x42-in. Worthington jaw crusher, is set on concrete foundation on the quarry floor, so that the receiving hopper is approximately 12 ft. above the floor. Two cars at a time are taken up the incline to the crusher by steam hoist. The crusher is set to discharge at 8 in. into a 42-in. link-belt pan conveyor of 75-ft. centers, which elevates the material and empties it into a 48-in., two-section, scalping screen with $4\frac{1}{2}$ -in. rings. The oversize, which runs anywhere from $4\frac{1}{2}$ to 8 in., is chuted to a bin under the screen from which it is loaded into end-dump cars and taken up either of two inclines, one leading to the kilns, the other to a special tipple and a railroad track. Here the stone may be loaded direct into cars for shipment as flux stone.

Material under $4\frac{1}{2}$ in. is loaded into cars under the scalping screen and taken up another incline to sizing screens where it is separated into blast-furnace stone, commercial stone, and screenings. These products are moved by gravity to their respective lines.

In addition to the three sizes mentioned, the company also produces two small sizes—one ranging from 200 to 20 mesh, 80 per cent through 100 mesh, the other from 20 to 8 mesh. Both products are used for glass-making, although the company has marketed a large percentage of the 200 to 20 mesh material for agricultural purposes. These two sizes are made from $1\frac{1}{4}$ -in. and down material which is conveyed by pan conveyor from the sizing screens to a Pennsylvania SX-4 pulverizer which grinds ap-

proximately 20 tons per hour. Two cylindrical steel tanks of 1000-tons capacity

"WE recognized five or six years ago that we could not operate our plant with economy if we relied on hand labor," says Mr. Forsyth, vice-president and general manager of the company. "We are located in a farming community, and have a certain fixed supply of labor on which we count at all times, but we have had to depend on foreign and 'floating' labor for our hand loading. Therefore, we rebuilt our plant so that practically no hand work is now necessary. Under favorable conditions with 26 men we produce 150 tons per hour and we can easily increase this tonnage by the addition of other shovel units."

provide storage for the two products. The material is removed from the tanks by screw conveyors which discharge into elevators. The elevators empty into patented swinging-arm screw-conveyor loaders extending from the side of the building and discharging direct into cars for shipment.

When not in use these loaders can be swung around so as to be flush with the building to permit the passage of a car. By placing a box car directly in front of one of the loaders, the arm can be pulled out so that it can discharge halfway back in either end of the car.

Loads for the kilns from the scalping screen are hauled up a separate incline by a double-cylinder, friction-drum steam hoist. At the top of the incline they are automatically dumped into a transfer car which in turn dumps into any desired kiln.

There are fourteen 11x60-ft. Keystone patented kilns having a total daily capacity of 125 tons. Due to the high speed of the cableway system, the kilns are filled in $4\frac{1}{2}$ hr., employing but one man in addition to the hoist operator. One man to every three kilns is employed in the lime shed, where the usual method of drawing and hand picking is employed.

Although a greater percentage of the lime shipped is in lump form, the company has equipment for making ground lime. Lump lime is hauled in wheelbarrows from the lime-shed floor to a jaw crusher. From the crusher it is moved by a pan-conveyor to an electrically driven Gardner pulverizer. The pulverizer discharges into an enclosed bucket elevator which delivers the ground lime into the overhead storage bins. From the bins it is loaded into box cars by a swinging-arm screw-conveyor loader. No extra men are needed for the manufacture of ground lime, as the operation is mechanical throughout after the lump lime is dumped from the wheelbarrows. Consequently, there are but nine men, including



These 10 houses are modern in every respect and keep the company's men contented

the hoist operator, employed in the entire plant.

The company owns 182 acres of land, 125 of which contain limestone running an average depth of 150 ft. An average analysis of the stone from samples from 40 consecutive cars for shipment, showed as follows: CaCO_3 , 98.21; MgCO_3 , 1.49; silica and insolubles, .15, and iron alumina, .15. This analysis shows the high quality of the deposit.

In order to keep competent, good help, the company has recently constructed ten modern houses of similar design so that the men are made satisfied and contented. It is the company's boast that few men

have left its employ voluntarily, for in addition to the provision of good living conditions, the policy of paying a premium for labor has always existed. Consequently, the occasional changes in the organization found at the average plant are unnecessary.

The officials and those responsible for the operation of the company are as follows: James C. Gittings, president; D. L. Warner, secretary, both of Baltimore; Russell K. Forsyth, vice-president and general manager, Pittsburgh, and Harry C. Stitt, treasurer, York, Pa. F. A. Johnson is the general superintendent, Thomasville, Pa.; Alexander Warner, traffic manager, and C. H. Trow, assistant secretary, both of York, Pa.

Industrial Byproducts for Building Materials

CARBURETTED LIME is a name given to residual product formed when calcium carbide is brought into contact with water to produce acetylene, according to the equation



It has been already demonstrated, some years ago, that this material can be conveniently employed for making a mortar which from the point of view of tensile and crushing strength, is analogous to the ordinary lime mortars.

Schumann-Krefeld states that, by way of experiment, a wall was built with mortar containing this carburetted lime and about 40 per cent of the sand commonly employed in workyards. At the end of 24 hr. the mortar was perfectly hard and could not be distinguished in any way from that made with slaked lime and sand.

With this same carburetted lime, freshly prepared, Hartmann obtained an excellent mortar for foundations and rough masonry.

In the case where plastering and finer walling are required, an addition of slaked lime is recommended at the rate of 50 per cent. Lime concrete is profitably made with 1 part of carburetted lime, 2 of cement, 9 of sand, and 20 of pebbles or gravel. There is a great variation in the composition of carburetted lime. Consequently, an analysis must be made in each case to ascertain what is utilizable. In fact, calcium oxide is the only element of value and represents an average of 32 to 35 per cent.

From the economic point of view, employment of this material is to be recommended, chiefly because it is a byproduct, and then because it saves the fuel required to burn an equivalent quantity of ordinary lime. Some time ago endeavors were made

to find an economic means to again bring carburetted lime to the form of burnt lime. It is filtered, in the slimy state, in special drums, or compressed and then collected in pits for evaporation, where it remains until it can be cut to pieces. It is recommended to mix a binder with it, such as sodium chloride or waste salts with a potash-base, or muscovite (potassic mica). Taken from the evaporation pits and saturated with the binding solutions it is burnt in a rotary kiln. Thus ordinary burnt lime is produced, and in lumps.

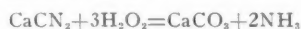
Ammonia Manufacture Waste

The Bayer Co. makes compressed blocks by another process, which are burnt without loss of shape. Thus a product is obtained which seems to be a good substitute for ordinary lime.

In some circumstances the following reaction occurs between calcium carbide and nitrogen:



Then under the action of steam under pressure one obtains



The residue from this composition is formed of calcium carbonate, carbide and carbide impurities. In the manufacture of ammonia this is an inconvenient byproduct, and endeavors have been made to put it to some use. According to Baumann it has the following composition:

	Per cent
Silica	3.55
Sulphuric acid	0.98
Iron oxide or alumina	2.05
Calcium oxide	43.85
Magnesium oxide	Traces
Free carbon	15
Loss in fire, carbonic acid, etc.....	34.67
	100

This material can be used as a base for

manufacturing cement by mixing it with clay and burning in a rotary kiln. Cement thus made is, according to Baumann, perfectly utilizable. Its hydraulic index is 2.09, and the approximate composition as follows:

	Per cent
Lime	60
Silica	22.5
Alumina	8

It is perfectly stable—i. e., does not expand. The resistance after 7 days is 15 kilos per sq. c.

Ferrous Shale Coke

In the direct combustion or the distillation of some combustible schists for oil a coke is produced which can be used in the cement industry. After being ground down it is run through an air separator to obtain a very fine dust, or "flour," which can be used as a substitute for portland cement.

Added in proportions up to 30 per cent, excellent results are obtained. A good binder for walling can be made by mixing lime, 1 part, with this powder, 10 parts. The shale contains 4.5 per cent sulphur and about 1.5 per cent of potash or soda. During combustion or distillation alkaline sulphides are formed. When blocks are made with this coke, white sulphuretted efflorescences appear on the surface if kept in a damp place. But when the powder is mixed with cement these efflorescences do not appear.

Residues From Gypsum Sulphuric Acid

Manufacture of sulphuric acid from gypsum has already been undertaken by the Bayer Co.

Compressed calcium sulphate, which constitutes a byproduct in other chemical operations, is mixed with carbon and suitable slag, containing silica, alumina, etc. This mixture is burnt in a rotary kiln and then collected in a drum to be cooled. The sulphurous acid formed is run into contact chambers and the residue to slag is ground down like an ordinary clinker. It makes an excellent cement.

It must be noted that natural gypsum is not used, and that the raw material employed is always briquetted. It is not known whether the experiments made with anhydrite have given good results, though this seems probable.—*Il Cemento*.

Simple Method of Rust Prevention

WHEN your shovel is to be stored for any length of time in the open, one excellent and inexpensive method of preventing the rusting of working parts is to cover these parts with ordinary turpentine of the cheaper grade says *Excavating Engineer*. This method has been found to be particularly effective in the tropics where the metal will often rust in 24 hr.

Two More New Sand and Gravel Plants in Wisconsin

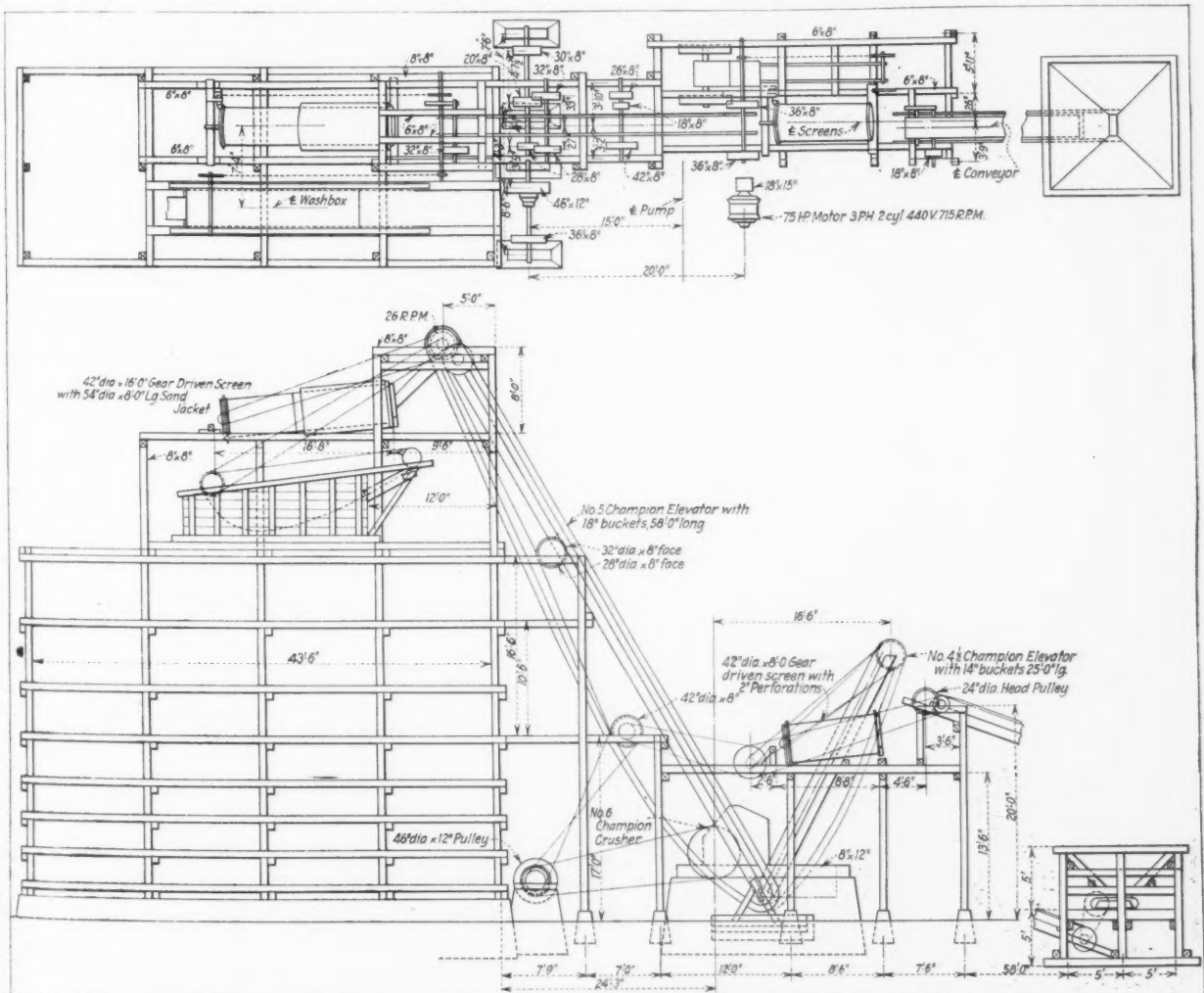
The Pound, Wis., Plant Is Driven by One Motor; the Maribel Plant Is Semi-Portable. Two Other Plants, the Appleton and the Sheboygan Operations, Were Described in the March 24 Rock Products

AT Pound, Wis., 40 miles north of Green Bay, is a plant put in operation in June, 1922, by the Champion Gravel Co. of Marquette, Mich. This company also operates plants at Champion and Loretto, Mich. The president and the general manager is P. B. Spear of Marquette.

This plant at Pound is essentially like the Appleton company's plant at Binghamton.

Excavation is by means of a Green drag scraper. There is a scalping screen and crusher for oversize and a screening, washing, and sand dewatering plant on top of the bins. One motor is used to drive the entire plant except for the scraper. Wooden loading bins provide storage for 500 tons, and from them gravel is loaded directly into freight cars on the track beside the plant.

The illustrations of this plant tell the story so well that but little description is necessary. A 50-hp. General Electric motor operates the American hoist which handles the scraper bucket. Under the horizontal railroad rail grizzly bar screen to which the scraper delivers material is a hopper and a Link-Belt apron feeder which delivers the material uniformly to a 24-in. concave belt



At the Pound plant of the Champion Gravel Co. everything from bucket elevator on corresponds to the Appleton Sand and Gravel Co.'s plant at Binghamton. At Binghamton the scalping screen and return elevator from the crusher shown here are replaced by an inclined grizzly over the crusher



In the center is the hoist house, and to the left of it the shelter protecting the main motor

conveyor 65 ft. long. This belt conveyor delivers into a 42-in. by 8-ft. scalping screen with 2-in. perforations, which permits the smaller material to go direct to the bucket elevator, while the oversize goes through a No. 6 Champion jaw crusher and back to the receiving end of the scalping screen by means of a 25-ft. bucket elevator with 14-in. buckets. This makes a closed circuit plant.

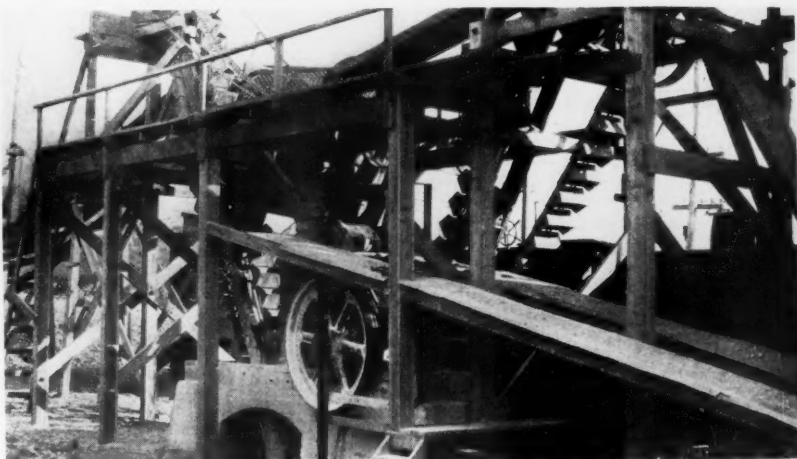
The main elevator is 58 ft. long and has 18-in. buckets, delivering into a 42-in. by 16-ft. revolving screen with a 54-in. by 8-ft. sand jacket. Four sizes of material are obtained—sand below $\frac{1}{4}$ in., which is reclaimed from a 4x18-ft. sand wash box; $\frac{1}{4}$ to $\frac{3}{4}$ in.; $\frac{3}{4}$ to 1 $\frac{1}{4}$ in., and 1 $\frac{1}{4}$ to 2 in. The capacity of the plant is rated at 750 tons in an 8-hr. day. The early operation of the plant, with three men working, gave an actual production of around 300 to 400 tons a day, representing the actual demands made upon the plant at that time. This was before the pit was well opened up.

A 4-in. American Well Works pump delivers water to the top of the plant for washing. An unusual use is made also of water furnished by the pump to give a final rinsing to the gravel as it is being loaded. Over each gravel-loading spout is a 2-in. pipe nozzle which can be turned on when the gravel is being loaded. This not only gives the material a final washing, but has some effect in speeding up the flow of gravel from the bin. At the gate of the sand bin there is a flexible hose which can be directed into the bin to loosen up the sand if there is any tendency to clog during loading.

Mr. Spear has a cottage at the plant, furnished and ready for the use of himself or his business associates or his family, when they desire to spend a few days at the plant. This is necessary because the plant is not near any town with hotel accommodations.

**Green Bay Sand and Gravel Co.'s
Maribel Plant**

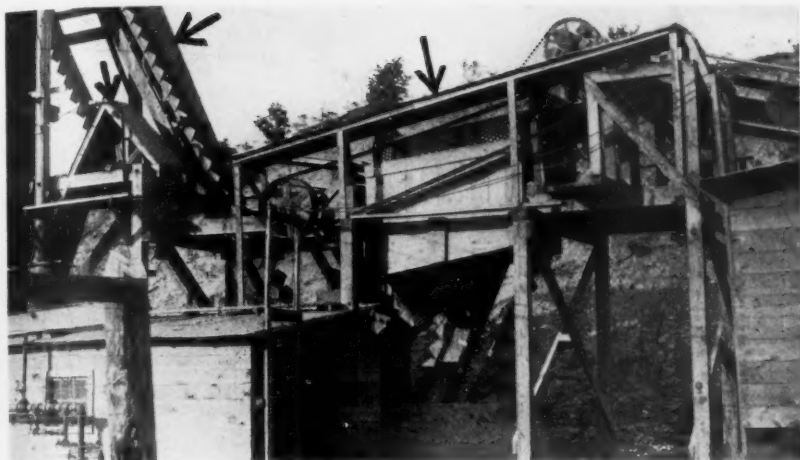
A semi-portable plant, with its foundation



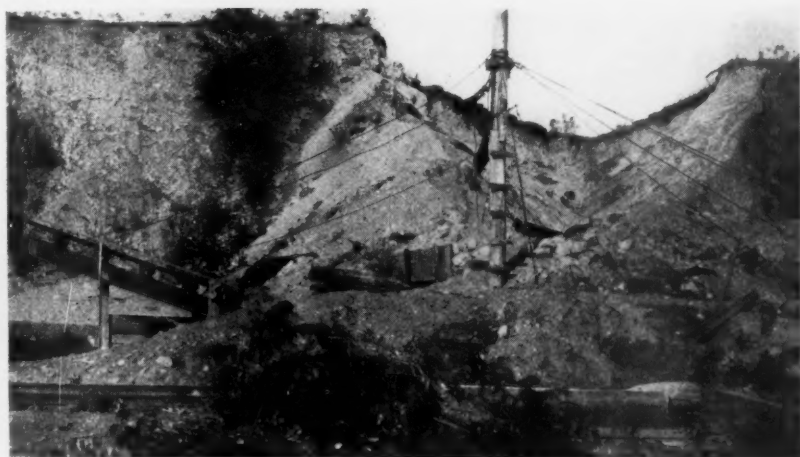
From the crusher side of the plant, showing the return elevator and chain drive at the left and part of the main elevator at the right



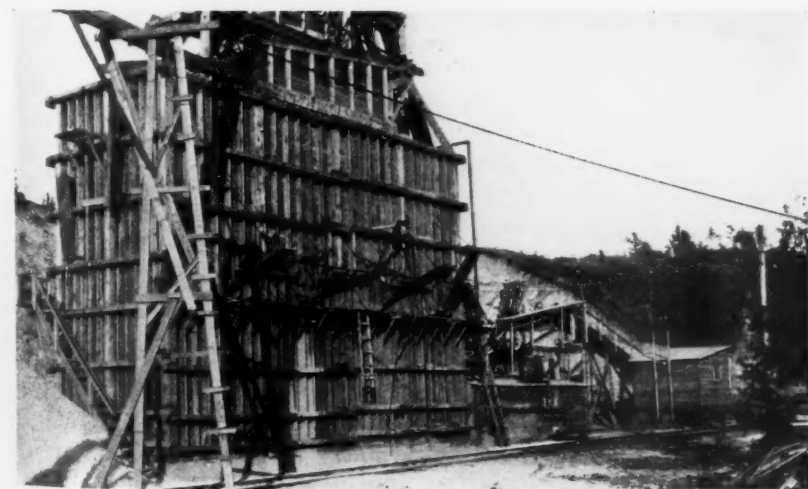
Practically all shipments from the Pound plant are made by rail over the loading track shown here



Driving belts and pulleys are covered to protect them from rain and snow. Three of the belt protectors are shown by the arrows



Soon after the pit was opened. The 12-in. cherry mast has $\frac{1}{8}$ -in. iron plates to protect it where the guy cables are attached



Over each of the three gravel-loading spouts is a pipe throwing a rinsing stream on the gravel as it is loaded. At the sand spout at the left a hose can be directed into the gate to make the sand flow more freely

timbers resting on railroad rails so that it can be moved along the pit in which it is working, is the one at Maribel owned and operated by the Green Bay Sand and Gravel Co., of which H. A. Bond is president. The shape of the deposit makes it desirable to have a plant of this movable type, and a plant of less permanent character is more suitable for this location because there is not at present a sufficiently stable and permanent market in the territory served by this location to justify a permanent plant.

This installation differs from the three already described in that it has a cableway excavator in place of the drag scraper used



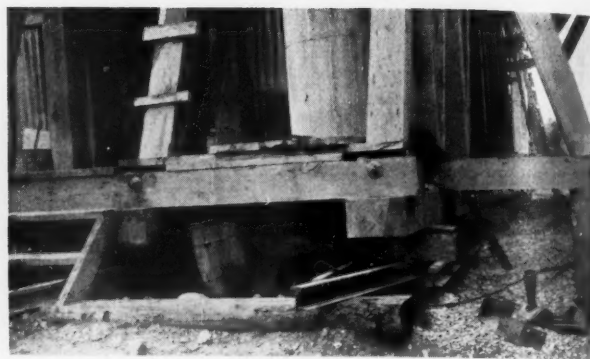
The Clyde hoist before its housing was erected



Getting a good load at the Maribel plant



This plant has an excess of boulders to deal with. This picture was taken shortly after the plant started operating



To make the entire deposit available the support along the rails permits the semi-portable plant to be hauled along the pit



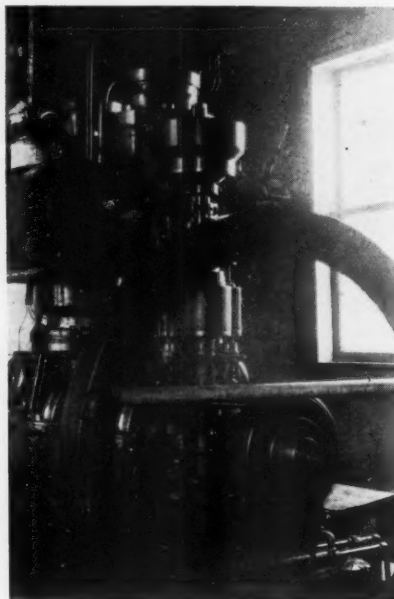
The bucket dumping to the hopper



The original plant before the excavator was added

at the other plants to bring the gravel to the hopper. This is a Sauerman excavator with 34-yd. bucket and 350-ft. span. An 8¼x10 double-cylinder double-drum Sauerman cableway excavator hoist driven from a Clyde boiler at 100 lb. pressure operates the cableway. The hoist and boiler stand on a bank nearly level with the top of the bins.

The plant in its present form embodies some changes in operating methods from those originally planned, hence the design is not ideal from the point of view of the present operating methods, but at the end



All but the pump and hoist are operated by this 35-hp. gasoline engine

of the first season the plant appears to function very satisfactorily.

One change that would have been made if the plant had been designed for the present equipment is in the hopper location. This would have been on top of the plant over the screens instead of lower down. The cableway could deliver as well to the higher location, and an elevating operation could have been saved.

The gravel deposit at this plant has an unusually high percentage of boulders 12 to 15 in. and even larger—too large for the crusher to handle—and one serious problem has been to dispose of these. It is necessary to keep one or two men at the hopper all the time to push these boulders off the horizontal grizzly to which the cableway bucket discharges. The pile of this oversize collected between June and September of this past season is shown in one of the illustrations.

All the excavated material which will pass the grizzly in the hopper goes through the jaw crusher and by means of a continuous bucket elevator to the screens and sand tank over the bins. This part of the plant is similar to the others already described.

Running the Pump with a Fordson

The crusher, elevator, screens, and sand scraper are operated by a 35-hp. Raymond log-loader gasoline engine. A car puller is operated by the same engine through a clutch-operated drum. A Fordson tractor drives the pump through a belt drive, as shown in one of the illustrations. The plant is capable of producing 350 to 400 tons in a 10-hr. day.

Measuring Stone Fatigue

IT has long been known that a load much below its apparent breaking strength would cause failure of stone after a long time. The Bureau of Standards is now undertaking a series of tests to determine the extent of this effect and to see how much load can safely be borne by stone for indefinite periods.

Samples of stone will be tested both in straight compression and in bending. Loads will be put on and left there, and the deflection of the stone will be measured from time to time.

Marble has the peculiar quality of sagging slowly, even under its own weight. Thus many cases are known in which marble slabs placed horizontally for a hundred years or so have sagged down several inches, and thin tombstones of marble have bent over.

"Safety First" on a Large Scale

By George M. Earnshaw
Associate Editor, Rock Products

Florida Phosphate Co. Stages Elaborate First-Aid Contest to Create Enthusiasm for Safety Among Its Employees

THAT the American Agricultural Chemical Co. at Pierce, Fla., realizes the merits as well as the necessity of safety-first work, was evidenced on Saturday afternoon, March 10, when four groups of six men each, representing the departments of the company's organization, engaged competitively in administering first aid to "make

includes surface operations of all kinds wherever there is a likelihood of human injury by accident.

Local chapters of this association were organized at four of the phosphate operations of Florida in the summer of 1922 by R. F. Cobb, of Birmingham, who was sent out by the national association. Mr. Cobb

spent several weeks in the phosphate fields, organizing chapters at the American Cyanamid Co., Florida Mining Co., the International Agricultural Corp. and the American Agricultural Chemical Co., working out schedules by which each chapter would stage contests semi-annually. He further developed a program which would permit the



A typical inter-company safety-first contest. Note the equipment at left

believe" injured, with a silver loving cup as an incentive.

To say that the effort at creating enthusiasm for safety first was not in vain is but expressing it mildly, for not only were there present as an audience the employees and families of this company, but also employees and their kin from neighboring operations, assembled as one, to learn what they could of how to care for a fellow-being in physical distress.

The teams which participated in the contest comprise a local chapter of the Joseph A. Holmes Safety Association, with headquarters at Pittsburgh, Pa., which is an organization originally founded by the Department of the Interior, Bureau of Mines, for the safety and welfare of underground miners, but which has expanded until it now



This is what causes a lot of pep and we can't blame them, either

team from each chapter which had made the highest average in the two contests to enter an inter-company contest to be held annually, thus creating a truly competitive atmosphere in the entire phosphate district.

The contest which it was the writer's pleasure to witness was one of the semi-annual intra-company meets, and was held on the lawn of the company's hotel, protected from the hot Florida sun by the branches of large trees draped by hanging moss. An area approximately 40 ft. wide by 200 ft. long was roped off, and benches and chairs were placed outside for the onlookers. Within, four oblong spaces, 10 by 16 ft., were marked by white lines, similar to the manner in which tennis courts are laid out, with a space of 4 ft. between spaces.

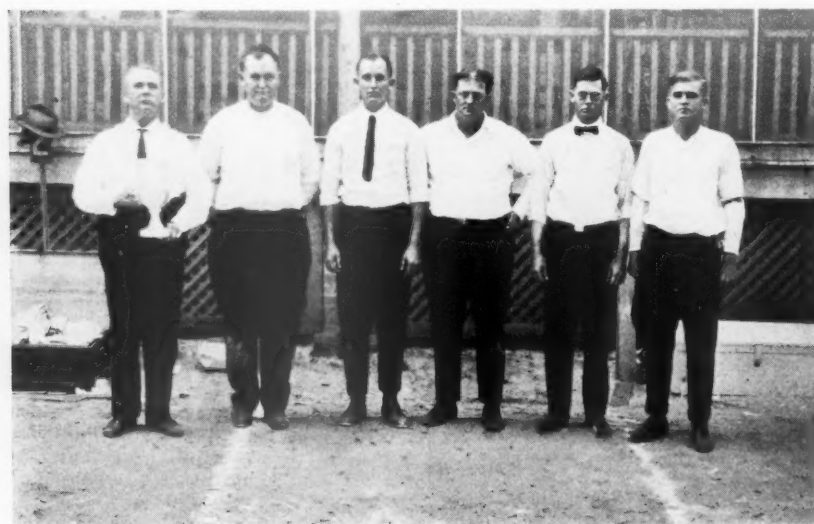
Each box, or space, represented the work-

ing area of a team, additional space at the end of each box being available for bandages, splints, medicine and other equipment. Outside these spaces and within the roped off area, tables and chairs were provided for the recorders, timekeepers and field manager, the space between the teams' boxes being provided with chairs for the doctor-judges.



Administering artificial respiration to a "patient" who has been in contact with a live electric wire

At the sound of a gong, the field manager announced that the teams would be given three problems each, all teams to work individually on the same problem at the same time, the team captains being allowed two minutes to read the problem to their men before beginning the administration of aid.



The winning team with its cup. But it's not theirs until they win it twice

Each team before beginning a problem was credited with a perfect score of 100, from which discounts would be made on the following basis:

1. Not doing the most important thing first:

- a. Failure to temporarily control hemorrhage previous to application of tourniquet 7
- b. Failure to remove patient from dangerous gas, roof, wire, etc., at proper time 4
- c. Failure to do the most important thing first, otherwise than mentioned in a and b. 6
2. Slow and indifferent work:
 - a. Slowness in work—One minute to

- of patient for artificial resuscitation 3
- b. Incorrect timing of artificial respiration 2
- c. Ineffective method of artificial respiration 9
5. Splints:
 - a. Improperly padded 2
 - b. Improperly applied 4
6. Unclean first-aid material 3
7. Failure to be aseptic 9



Treating a dislocated jaw, a fractured elbow and a compound fracture of leg

- be deducted for each minute consumed over time allotted for working of problem 1
- b. Lack of attention on part of one or more team members 2
- c. Lack of neatness 1
3. Defects in bandaging:
 - a. Failure to entirely cover wound 2
 - b. Bandaging or treating wrong loca-

8. Failure to have on hand sufficient and proper material to complete dressings 3
9. Awkward handling of patient 4
10. Assistance lent by patient 2
11. Arterial bleeding:
 - a. Application of tourniquet so as to not stop bleeding 10
 - b. For non-application of tourniquet (charge additional to a) 2
 - c. Tourniquet applied so as to stop bleeding at wrong points or in such a way as to injure patient 4
12. Not treating shock 6
13. Failure to command properly 1
14. Improper treatment not covered by above, such as wrong dressings, etc. 4

The problems were sealed individually and presented one at a time to each of the captains. The three problems were as follows:

No. 1—Man is found apparently not breathing; is on his back with left hand and forearm in contact with live electric wires. Rescue two of team demonstrate artificial respiration five minutes—first man for three and second for two minutes, rhythm not to be broken while changing places. Dress burns at point of contact with electric wire. Treat for shock.

No. 2—Treat the following injuries: Simple fracture of right elbow; dislocation of lower jaw; compound fracture middle of left leg. (Patient conscious but in state of shock.)

No. 3—Man has fractured pelvis in mid-line of body (front); nose broken, bleeding profusely; wound on point of shoulder 1 in. long and bleeding slightly. Patient in state of shock. Treat.

The nature of each of these problems had been kept secret so that no member of any

- tion of injury 2
- c. Tight bandage 2
- d. Loose bandage 2
- e. Improperly applied bandage 2
- f. Insecure or granny knot 1
4. Defects in artificial respiration:
 - a. Improper or insufficient preparation

of the teams knew with what they were to be confronted. That the men participating were familiar with all phases of rescue and first-aid work was clearly shown by the remarkable scores obtained, the lowest one being 95 and the winning score 98. It is evidence of thorough and careful study of the work from the most simple problem to the difficult ones with which they were confronted at this contest.

The work carried on by this and other companies in the phosphate district of Florida should be an example to producers of other rock products, and should encourage those who are weak in this respect to become strong and the strong to become

stronger.

Let us take the situation presented in problem No. 1 of this contest, for instance: Suppose one of your men was found "apparently not breathing with his hand and forearm in contact with live electric wires"! Have you men in your employ who would know what to do to save that man's life? Even if you have, do *all* of your employees know what to do in such a case? If not, why not have them learn? It takes less time to prevent an accident than it does to report one. The Bureau of Mines will gladly send bulletins and literature that will help any operation to organize a safety-first unit.

Lime Plaster Hardener

"Secret of the Pharaohs Re-Discovered"

THE Schaffer-Alles Chemical Co., Pittsburgh, Pa., announce that they have found it. It is the thing research specialists in the lime industry have been assiduously searching for the last year or two—already the subject of a number of patents. It is a *lime plaster quick hardener*. The discoverers are enthusiastic. A. A. Alles, Jr., vice-president of the new company writes:

"The process of making lime mortar used in the days of the Pharaohs has been re-discovered!

"This sounds almost unbelievable, but we think it's true.

"We have adopted the trade name 'Piercite' for the compound, which, when added to hydrated lime, makes a perfect lime plaster, which will set uniformly on the wall in the course of a few hours.

"The lime hardener compound 'Piercite' will be manufactured by the Schaffer-Alles Chemical Co., with headquarters at the above address. John C. Schaffer is president of the company; A. A. Alles, Jr., vice-president and secretary. James H. McNamara, president of the Eagle Rock Lime Co., Eagle Rock, Va., is the treasurer and another principal stockholder. A. F. Cooke, vice-president and general manager of the Fawcus Machine Co., Pittsburgh, is another stockholder.

"We have been working quietly on this and have thoroughly demonstrated it to our own satisfaction, and are now ready to take the world into our confidence. Mr. Breskin (Rock Products advertising manager) will recall that I showed him a slab of lime which had been hardened by a small percentage of 'Piercite'. We have taken a piece of this lime and placed it in a vehicle of boiling water, and after letting it remain there for some time, have removed it and it rang to the tap just as it did before it was placed in the water; in

other words, there was absolutely no disintegration.

"We have placed our lime plaster on walls alongside of patent plaster, and at the end of several weeks, rubbing the hand over the surface of the patent plaster would cause small particles to drop from the wall, whereas ours held like cement. There is not an ounce of cement in our compound. We can control the seating of the plaster.

"This discovery, we confidently believe, will bring back to the lime manufacturer the business he has lost to the patent plaster people.

"After all, lime is the only real plaster, and we have overcome the only objections to it. A ton of our lime plaster will go more than half again as far as a ton of patent plaster, and there is absolutely no setting or hardening in the mortar box. Mortar left over from the night before can be retempered and used just as well as a fresh mix. There is no waste.

"The Schaffer-Alles Chemical Co. plans to manufacture and sell the 'Piercite' compound to the lime manufacturers, who in turn will mix the compound with their hydrated lime, to be sold to the trade in bags.

"'Piercite' lime plaster will adhere to any kind of a wall, and is suitable for partition blocks, and the same material will be used for masonry work."

FIRST NATIONAL SLATE MEETING

THE first national meeting of the National Slate Association will be held at the Hotel Commodore, New York City, on April 20.

Some Fine Limestone Publicity

WHEN the Chicago Tribune publishes on its editorial page, under the heading "Editorial of the Day," an article on limestone appearing in the *Breeders' Gazette*—it's fine publicity for limestone! Furthermore, it is a plea for the farmer to give deserved recognition to what the railroads are doing to co-operate with the farmers and the limestone producers. Here is the article:

FREIGHT ON LIMESTONE

While the political mouthpieces of unrest and adversity in this country are hammering away at the railroads, the onlooker who tries to be fair may remark that the roads have decreased the freight on limestone from \$2.40 to 80 cents per ton in southeastern Kansas. As a result of this concession to the owners of acid soils in that region, many carloads of ground limestone are being applied. Important reductions in freight rates on this substance and ground rock phosphate have been made by several railroads in Illinois, in which there are large areas of acid soils.

Some of the railroads, therefore, cannot be accused of indifference to co-operation with farmers. The officials of these lines are to be complimented upon learning more quickly than some of their critics have learned that ground limestone and phosphate applied to soils increase crop yields. In hauling these materials at nominal rates the companies are not philanthropic; they are, however, enterprising, far-sighted and public-spirited.

Where tons of limestone are hauled into sour soil regions, thousands of tons of increased freight for the roads are sure promptly to grow out of the sweetened soils. Agriculture is diversified and farm wealth increases where limestone is applied to acid soils.

The railroad companies are interested in developing a large, stable agricultural tonnage, well distributed through the year. In order to achieve this object, they can well afford, under present conditions, to carry limestone, phosphate, and other forms of plant food at reduced rates into regions where farmers desire to use them. We give the companies credit for learning that fact. They know that there is plenty of agricultural freight wherever good farming is done on fertile land.

By helping farmers to restore and maintain the fertility of their soils, the railroads are helping themselves. Maybe farmers could help themselves by trying in these trying times to be fair to the railroads. Maybe in the end that is the shortest road to reduced rates on all kinds of freight.

New Idaho Cement Plant

WORK was begun early in March on a new portland cement plant at Lime, Idaho, 25 miles west of Weiser on the Snake river. Lime is on the Huntington branch railway.

The essential minerals are said to be found here in sufficient abundance to supply a 3000-bbl. cement plant for 200 years.

The plant is expected to be completed by next fall. The builders are the Columbia Cement Co., Concord building, Portland, Ore.

The Well Drill's Use at Lime-Plant Quarries

To Promote Greater Efficiency in This Industry, the Bureau of Mines, Through Its Preliminary Reports, Hopes to Develop Operators' Discussion with the Bureau of These Problems

By Oliver Bowles

Mineral Technologist, U. S. Bureau of Mines

IN an endeavor to promote greater efficiency in the lime industry, the Bureau of Mines is preparing a series of preliminary reports dealing with particular problems of the industry. Through the circulation of these reports, it is hoped that sufficient interest may develop among lime-plant operators to prompt them to discuss with the bureau their own experiences with these problems. By such an interchange of ideas, it is believed that conclusions may be reached which will be of practical benefit to the entire industry.

The first report, "Stripping Problems in Limestone Quarries of the Shenandoah Valley," Serial No. 2401, was issued during October, 1922. This report is the second of the series. It is hoped that many operators will contribute additions to the information now at hand.

Type of Blasting Required at Lime-Plant Quarries

Limestone for lime-burning is obtained chiefly from open-pit quarries situated on ledges of high-grade rock. In blasting down these rock ledges the disruptive force exerted should be somewhat less severe than in blasts at cement-rock quarries, and yet more disruptive than at dimension-stone quarries. In blasting rock for portland cement manufacture the purpose is to shatter the strata as much as possible, for the raw materials are all ground to a fine powder before burning. On the other hand, blasting for dimension stone must be conducted with the greatest care as the massive blocks must not be shattered. Blasting for lime manufacture falls in an intermediate position between these two extremes, for while the charges must be heavy enough to throw down great masses of shattered rock, the purpose is to obtain a large proportion of fragments more than 4 in. in size, and a minimum of fines. This is due to the fact that in burning lime in all ways, except in the rotary kiln, practically all materials under 4 in. must be excluded. In working out the spacing

of drill holes and the nature and quantity of explosive this principle must be kept constantly in view.

Drills Used

Tripod drills are used in many localities in drilling horizontal, inclined, or vertical holes for primary blasting. An air driven rotary type gives good service, especially for drilling holes in the quarry face. Hand-manipulated, compressed-air hammer drills are used somewhat for primary drilling, but chiefly for secondary drilling in preparing pop shots to break up the larger fragments. Of late years the well drill is used very widely for primary drilling in place of tripods.

Hammer and Tripod Drills

While the hammer drill is more rapid in operation, more easily moved from point to point, and may be held with the hands without a tripod, even for holes of 12 to 20 ft., it is not generally employed for heavy blasting on account of the small size of the steel. The ordinary hammer drill employs 1½-in. steel in beginning a hole, while the tripod hole is 2¼ in. in diameter. As the depth occupied by 4 lb. of dynamite in the hammer drill hole would accommodate 9 lb. in the tripod hole, the latter is generally preferred. The opinion has been expressed by some quarrymen, however, that the speed of operation of the hammer drill more than compensates for the restricted size of the holes, and on this account the hammer drill is used for primary shots. Operators who have drilling and blasting records indicating the relative efficiency of the tripod and hammer drill would render a useful service to the lime industry by submitting the figures to the bureau for analysis and general presentation.

Tripod holes may be drilled either from the top or from the face, the latter method being often employed where an irregular or seamy rock surface makes vertical drilling slow and costly. In some places drilling from the face is preferred even where there is no impediment to vertical

drilling. Also, "snake" holes may supplement the vertical holes where a heavy mass is to be removed, or where it is otherwise difficult to break the rock effectively at the quarry floor.

Well-Drill Blasting

The well drill has been used widely in quarry work during recent years. Recent modifications and improvements are described in the catalogs of the various manufacturers. Well drills may be operated by steam, gasoline, compressed air or electricity. The latter is probably the most convenient and requires the least labor.

Heavy blasting in deep well-drill holes is commonly employed in limestone quarries, particularly where the product is used as crushed stone or for cement manufacture. The method is less widely used at lime-plant quarries, partly on account of unfavorable quarry conditions, and partly because quarrymen are unfamiliar with the advantages or the method of operation of this type of equipment. Faulty blasting in well-drill holes has also aroused the prejudice of many observers. A few years ago this drill was tried in a limestone where clay pockets were numerous and continued many feet below the surface. Unfortunately, the drills either penetrated or came in close proximity to the clay pockets or cavities with the results that most of the force of an expensive charge was dissipated and the rock ledge was scarcely shattered. Well-drill blasting is now conducted successfully in this same quarry by avoiding clay seams and pockets, but the one glaring example of failure has discouraged the employment of such drills in surrounding quarries.

It is desirable to consider the advantages and disadvantages of the drill and the conditions governing its successful use.

Advantages Claimed for the Well Drill

An outstanding feature of drill operations in deep quarries is the substitution

of a single bench the full height of the face, for a series of benches. The disadvantage of multiple bench quarrying that may be obviated are: (1) Danger to workmen of rock fragments falling from one bench to another; (2) loss in productive capacity where men are watching for dangers from the bench above them; (3) loss of time and danger of accident where workmen climb ladders and move explosives and equipment from bench to bench; (4) undue complexity in transporting loaded rock from different levels.

Another undoubted advantage is that well-drill holes are as large at the bottom as at the top, while tripod or hammer-drill holes diminish in size with increasing depth. Thus the small holes are usually sprung with dynamite to give space for the explosive, a tedious and somewhat dangerous operation, while well-drill holes ordinarily require no springing.

According to some authorities the drilling cost is lower for well drills than where the smaller drills are used, but opinions differ. The purpose of drilling is to obtain space for the explosive, and consequently the only fair method of comparing costs is to consider drilling, not in terms of cost per foot but on the basis of the volume of space obtained. Well-drill holes are usually about 6 in. in diameter. It is claimed that some of the improved hammer drills will project holes 30 to 36 ft., and will maintain a diameter of 2 in. at the bottom. The volume of drill holes of various sizes varies as the square of the diameter, therefore a 6-in. churn-drill hole of a given depth has 9 times the volume of a 2-in. hole of the same depth. Hence if no springing is employed it requires nine 2-in. holes to provide explosive space equal to that supplied by one 6-in. hole. For lower benches the tripod or hammer-drill holes may maintain a diameter of 2½ in. to the bottom, and about six such holes are equivalent to one well-drill hole. The problem of relative cost therefore, where springing is not employed, resolves itself into the question. Is the total cost per foot, including repairs, overhead, interest on investment, etc., six times as great for well drills as for small drills that bottom with 2½-in. diameter, or nine times as great as for small drills that bottom with 2-in. diameter? The advantage probably lies with the small drills for shallow benches, and with the well-drill for high benches. It would be very interesting to obtain cost figures indicating the height of face for which the drilling costs were equal for each type of machine.

If the practice of springing the small drill holes is followed, a comparison of efficiencies of large and small drill holes is more difficult. The cost of the time and explosive employed in chambering the holes must be added to the drilling cost, and the volume of the chamber obtained must be compared with the volume of the

well-drill hole in order to compare the methods properly.

There is considerable delay in all quarry operations when primary blasts are discharged. All quarry workers must remain at a safe distance and it may be found necessary to move some of the equipment. Blasting in well-drill holes is usually on a large scale, a single blast at times supplying rock for several months' operations. Therefore, there are smaller losses from delays incident to big-hole blasting than where more frequent blasts are discharged in the smaller drill holes.

It is claimed by some quarrymen that heavy blasts in well-drill holes break the rock very effectively, requiring little secondary blasting, while advocates of small-hole blasting claim that the more general distribution of the explosive throughout the rock mass in small holes breaks the rock more completely, requiring less block hole shooting than where the well-drill is used. These opposing views leave one somewhat in doubt. Undoubtedly different results are obtained in different types of rock. In either case the amount of secondary blasting depends largely on the quantity of the explosive used, and the arrangement of drill holes for the primary blast.

Unfavorable Conditions for Well-Drill Operation

The well drill is most advantageous where the quarry face is from 30 to 100 ft. high, though it has been used successfully on benches of not more than 20 ft. As low benches require closer spacing of drill holes and lighter charges, the smaller types of drills are usually preferred.

In many limestone regions the rock is greatly dissected by erosion, leaving a very rugged surface over which it is difficult to move a well drill, and where it must be mounted on a timber staging. Where this condition is pronounced it may be cheaper to drill from the face with tripods, rotators, or hammer drills.

Limestone beds, particularly in the Appalachian belt, may be tilted at steep angles, and the steeply inclined beds may be separated by open or clay-filled seams. When the drill bit meets such a slanting surface it may be diverted, forming a crooked hole in which the tools may bind, thus causing great loss of time with possible loss of drill bit and abandonment of the hole. To overcome this difficulty pieces of rock, wood, or cast iron may be thrown into the hole so that the drill will pound on them for a considerable time. When the downward progress of the drill is thus retarded it enlarges the hole, particularly by cutting away the rock that tends to divert it from its vertical course, and thus the hole is straightened. Another method is enlargement of the hole by exploding a stick of dynamite in it. It

is claimed that with improved types of cutting tools, such as the "Gill" bit, little difficulty is encountered with inclined seams. If delays are excessive it may be preferable to drill from the face. An alternative method is to work out the rock in low inclined benches, utilizing the open seams for bench floors.

In some deposits the successive beds may vary in composition to such an extent that they must be applied to different uses. Thus in one Pennsylvania quarry the upper beds are used for fluxing and road stone, and the lower beds for the manufacture of pure chemical lime. It is obvious that such a quarry cannot be worked as a single bench, and thus is not adapted for well drills unless one or more of the separate benches is at least 20 or 25 ft. in height. In this particular quarry the upper ledge is drilled from the surface with tripods, and the lower ledge is reduced by blasts in chambered snake holes.

Factors Governing Successful Blasting

In the arrangement of well-drill holes, according to Russell,* a single row of holes is probably best where the quarry face is 50 ft. high or over; if 20 to 30 ft. in height, 2 to 5 rows may be shot at a time. Where two or more rows are shot at one time the alternate rows are usually staggered. The burden and spacing may vary considerably in different types of stone. It is probably better to begin with a close spacing and gradually increase it until the maximum spacing that will shatter the rock is attained. In an average limestone worked from a quarry with a 35- to 40-ft. face the spacing should be 10 to 12 ft. and the burden 12 to 15 ft. Both spacing and burden should increase with increasing depth of holes, but should rarely exceed 20 ft. for the deepest holes.

Clearing the Toe

In approximately flat-lying beds an open bedding place may sometimes be utilized to form the quarry floor, and in such circumstances it is comparatively easy to blast out the rock to the base of the ledge. Where no open bedding seam exists or where the rock is steeply inclined and no joint is present that may be used for a floor seam, it is a more difficult matter to clear the rock at the toe. A common mistake in drilling is to drive the hole too short a distance below the quarry floor level. One blasting expert advises a depth of 5 ft. below grade in solid limestone. Usually a certain amount of rubbish accumulates in the drill hole before it is loaded, and therefore it is better to drill too deep than too shallow.

*Russell, S. R., "Pointers on Use of Explosives in Quarry Blasting."

Avoidance of Pockets and Seams in Drilling

In drilling either large or small holes it is of first importance to keep the drill in solid rock, and, so far as possible, to avoid drilling in close proximity to seams and pockets. If open seams occur in any definite system or exhibit any degree of regularity it may be wise to plot their direction and dip and thus determine the proper position for drill holes. Where irregular crosion cavities occur their positions may not be foreseen and drill holes may be lost by meeting cavities. If large open or clay-filled spaces are encountered, it is generally advisable to abandon the hole. Where the drill hole cuts a seam of moderate size the hole may be used if no explosive is placed close to the seam, the drill hole, from a point 3 or 4 ft. below the seam to a point 3 or 4 ft. above it being filled with stemming.

Choice of Explosives

Ammonia dynamite is the most common explosive used in quarry work. Gelatin dynamite should be used in wet holes. For lime-kiln operation, explosives with a high rate of detonation should not be generally used. The high-grade explosive tends to shatter the rock into small pieces that are not used in lime burning except in the rotary kiln. Dynamite of from 30 to 40 per cent strength is most satisfactory. In seamy rock some operators advocate the use of black blasting powder which will penetrate the seams and push out the rock masses with little shattering.

Estimation of Charge

At many quarries a determination of the amount of explosive to be used for the entire charge or for each drill hole is a matter of judgment. Neither high blasting efficiency nor consistent improvement in blasting methods are to be expected unless the charge is regulated in accordance with the estimated tonnage of rock to be moved. The determination of tonnage is so simple that any blasting foreman with a common school education can work it out without difficulty. The tonnage for any particular drill hole is obtained by multiplying the burden in feet by the spacing in feet, by the depth in feet, thus obtaining the number of cubic feet of rock; multiplying this by the weight of a cubic foot of limestone, usually about 160 lb., and dividing by 2000. Thus if the burden is 15 ft., the spacing 12 and the depth 50, the number of short tons of rock to be moved by the explosive in each drill hole is

$$\frac{15 \times 12 \times 50 \times 160}{2000} = 720 \text{ tons.}$$

In determining the charge care must be given to the number of tons that should be broken by each pound of explosive. In average quarry practice, this varies from

3 to 6 for each pound of 40 per cent ammonia dynamite, depending on the toughness of the rock. The first charge may be estimated on an average basis, say 4 tons per pound. Thus for the drill hole mentioned above 180 lb. of dynamite would constitute a reasonable charge. When the blast is discharged the results will indicate how nearly correct the charge was estimated. If the rock is insufficiently broken the next charge may be calculated on the basis of $3\frac{1}{2}$ tons per pound; if too greatly shattered it may be increased to 5 tons per pound.

Best results are obtained not only by varying the charge but in changing the spacing or burden of the drill holes. If the rock is brittle and is pulverized close to the explosive charge, while insufficiently broken at a distance, it may be advisable to use smaller drills and thus distribute small charges more generally throughout the rock mass.

Russell advises that where more than one row of holes is shot at a time, the

LIME ASSOCIATION CONVENTION

THE fifth annual convention of the National Lime Association will be held at the Hotel Commodore, New York City, on June 13, 14, and 15.

The work of the convention will be devoted in a large measure to reports from the technical men of the research organization, and from the field engineers of the association.

back rows should contain at least 10 per cent more explosive than the front row. He also recommends a shorter burden for the back rows.

Modifications in Charge for Steam Shovel and Hand Loading

For hand loading the rock should be thrown out in a thin sheet, while for steam-shovel operation the fragments should be piled in a steep ridge adjacent to the quarry face. The charge should be adjusted to give the desired result. In quarries with low faces where several rows of holes are shot at one time to provide stone for steam-shovel loading, a method known as "buffer" or "blanket" shooting is sometimes employed. Part of the broken rock from the previous blast is left against the face to offer resistance to the charge and thus secure better fragmentation. It also prevents rock from flying over the quarry floor and damaging or burying tracks. The buffer method is not applicable to faces more than 50 ft. in height.

Summary

Blasting efficiency depends to a great

extent on the type of drill used and the way in which it is used. The bureau desires as complete information as possible on conditions that govern the choice of drill, and the proper use of the drill chosen. Therefore, attention is directed to the following questions:

1. Can you submit data on drilling costs?
2. What type of drill do you find most efficient?
3. Have you ever tried the well drill, if so with what success?
4. How many tons of rock do you break per pound of explosive used in primary blasts? In secondary blasts?

Replies to these questions mailed to the bureau would be greatly appreciated.

"The Explosives Engineer"—a Hercules Publication

IT gives ROCK PRODUCTS much pleasure to be able to announce Vol. 1, No. 1 of *The Explosives Engineer*, a magazine for users of explosives to be published monthly by the Hercules Powder Co. The editors are Harry Roberts, Jr., and N. S. Greensfelder, the latter well known in the rock products industry as an explosives engineer and recently-elected chairman of the Manufacturers' Division of the National Crushed Stone Association.

The magazine is fittingly begun with a sketch and handsome halftone portrait of Dr. Munroe, the Bureau of Mines' explosive chemist, who has been prominently identified with the development of industrial explosives since 1873, when he was employed by the Lafin & Rand Co. to translate from the Italian an article on nitro-glycerin in Sombroso.

There is a tastefully illustrated article on "Uncle Sam's Explosives Engineers," written by Mr. Greensfelder, which is an account of the government's work on industrial explosives and how it benefits consumers. Space is also given to current events, such as the National Crushed Stone convention, the American Road Builders' convention in Chicago, and there are other contributions setting forth the uses of improved machinery and equipment, etc.

W. D. White executed four oil paintings made in the Pennsylvania anthracite field for the magazine, from which halftones have been made to show vivid studies in the life of the miner underground.

"We believe," says *The Explosives Engineer*, "that the industrial uses of explosives and closely related subjects are of sufficient importance to need a publication wholly devoted to them; and *The Explosives Engineer* will try to fill this need." Undoubtedly, this magazine will be a most welcome addition to the literature in this industry, and we wish it every success.

The Agstone Business Is Opening Up

CONTINUED remarkable recovery in the mail-order business leaves no doubt that the American farmer is both able and willing to purchase goods to the extent of his needs, says a financial writer in the *Chicago Tribune*. In fact, business in March was about the best in the history of the industry, according to the reports of two of the largest mail-order houses.

That the American farmer is so disposed is also shown in his increasing purchases of limestone for the betterment of his soil and a greater crop output. The agstone business is opening up, and reports from all parts of the United States go to show that this product is being accepted on its proven merits.

Undoubtedly, the farmer has largely to thank the agricultural colleges, experiment stations, state boards of agriculture, etc., for his great enlightenment on the value of this product, by no means forgetting the debt he owes to the individual work of the limestone producer, who in turn has had the hearty backing of the national associations.

For instance, a strenuous program has been prepared by the National Agstone Association at its Columbus and Harrisburg meetings. It will establish a research and review service and finance an advertising campaign. This work has been strongly endorsed by such soil experts as Dr. Firman E. Bear of Ohio State University and Prof. J. W. White of Pennsylvania State College, both of whom attended these meetings.

Again, every large limestone producer has pledged himself and his money to furthering the work of educating the consumer in the use of that product, and the National Crushed Stone Association has assured its sister association that it will assist in every way possible.

Recent Developments

In Kentucky it is reported that at present prices there are fewer crops that will pay higher returns for fertilizer than tobacco. R. E. Stephenson, soil and crop specialist of the Kentucky College of Agriculture, says that the experimental field at Greenville proves that limestone and acid phosphate, used in a rotation of tobacco, wheat and clover, increased the crop nearly two and a half times. J. B. Gardner, Calloway county agent, reports that the farmers have a plan under way to double their consumption of limestone this year.

The North Carolina tobacco branch station at Oxford, through experiments, has found that a dolomitic limestone, containing as much as 25 to 36 per cent magnesium carbonate, increased the yield and value of tobacco and did not darken the color.

Director E. G. Moss states that splendid

results from the use of dolomitic limestone were obtained where 1000 lb. were applied in the drill per acre under tobacco, and that where one ton was used in the drill per acre indications were that it was profitable to do so. Good results were also obtained from applying one ton per acre of dolomitic limestone broadcast.

The American Limestone Co., Knoxville, Tenn., quotes the *News and Observer*, Raleigh, N. C., as saying: "Tobacco is being studied at both Reidsville and Oxford. The tests at Oxford on 36 different plots show that dolomitic limestone has increased the yield of tobacco on all plots and that there is less leaf spot trouble where this form of lime is used than where not used."

As a result of campaigns for the use of



Compare these two tobacco growths. Shown by courtesy of the American Limestone Co.

legumes in cropping systems conducted by agricultural extension workers in North Carolina in 1922 more than 2000 acres were planted to summer legumes and 6000 acres to winter cover crops, which were largely legumes, according to reports to the United States Department of Agriculture from negro farmers in that state.

Harrison Fahrnkoff, Illinois Farm Adviser, in advising farmers, said: "Limestone can now be secured in McLean county at prices lower than for several years. Can you think of a ton of anything else that you can get shipped into the county for

\$1.40 or \$1.50? If you have a good mineral supply of limestone in your soil, your clover growth will withstand very severe conditions during August and September."

Carloads of limestone for soil improvement were unloaded at Scammon and Columbus, Kans., the first week in March, and also a carload at Neutral and Scammon the week following.

John W. McArdle of the Indiana Public Service Commission says that intrastate freight rates on limestone will drop 25 per cent as soon as the railroads can publish the new tariffs. An immense amount is transported to this state each year, said he.

Through the efforts of the Iowa Farm Bureau Federation, limestone freight rates have been materially reduced. Farmers' orders are being placed at the bureau by men who want a ton or more.

In Kentucky the Calloway county farmers have plans under way to double the amount of limestone used last year.

The foregoing reports are taken from ROCK PRODUCTS' news service as a few examples of the many similar reports which are coming to this magazine almost daily.

Recent I. C. C. Decisions

Sand Increases Not Justified—The commission, in a report on I. and S. No. 1710, sand and gravel from LaFayette, Ind., to Chatsworth and Gilman, Ill. (opinion No. 8279, 77 I. C. C. 719-23), has held, as not having been justified, proposed increases in rates on sand and gravel, from LaFayette to Gilman and Chatsworth, and points intermediate, on the line of the Illinois Central.

The object of the schedule suspended was to close the route of the Big Four and the Illinois Central, via Kankakee, 100 and 117 miles to Gilman and Chatsworth, respectively, on the ground that the rates, \$1.01 and \$1.10, intended to be applicable over the route of the Big Four and Toledo, Peoria & Western via Sheldon, Ill., 66 and 82 miles, were too low for application over the circuitous route through Kankakee. It was asserted that the rates, if applicable via the Big Four and Illinois Central, were not intended, and were too low for such long hauls via two lines.

The question as to the rates from the points of origin mentioned was important because Illinois had let contracts for much road improvement work for which gravel from LaFayette was to be used.

Sand Rates Condemned—An award of reparation based on a finding of unreasonableness has been recommended by Examiner John B. Keeler in a report on No. 13644, Muncie Sand Co. vs. Director-General, on sand from Muncie, Kan., to destinations in Missouri and Kansas, shipped between July 19 and November 26, 1919. The complaint followed the adjustment made by the carriers of their rates on sand. Keeler said the rates applied should be held unreasonable to the extent they exceeded the basis prescribed in that decision.

Pictorial Record of a Blast

Moving Picture Film of a Blast at Ohio Marble Company Quarry, Piqua, Ohio

THROUGH the courtesy of Harry H. Brandon of the Ohio Marble Co., Piqua, Ohio, we are able to give here a

remarkable picture record of how a blast works. The blast holes were made with a Cyclone well drill, $5\frac{1}{2}$ in. in diameter, 38

ft. deep. The face of the quarry is about 34 ft. Each hole was loaded with approximately 100 lb. of Hercules Special No. 2



Fig. 1—All set ready to go!



Fig. 4—Another 1/16 second! Rock commencing to move



Fig. 2—Gone! Faint haze rising from drill holes



Fig. 5—Now it is 3/16 second more! Rock is rising



Fig. 3—Just 1/16 second later!



Fig. 6—Another 3/16 second—rocks well in the air



Fig. 7—Now $3/8$ second more has elapsed and the old jumbo lump has reached its highest elevation



Fig. 9—Smoke mostly cleared away and cliff just parting at the top (right) $3/8$ second later than Fig. 8



Fig. 8—Another $3/8$ second and the flying fragments have settled down. Note the cliff on the right starting to slide



Fig. 10—Cliff has parted at right and boulder is in the act of sliding to rest— $3/8$ second later than Fig. 9

dynamite and the holes were fired simultaneously by Cordeau-Bickford. The holes were tamped with moist stone screenings.

These views are taken from a moving-picture film showing the Ohio Marble Co. operations, first exhibited at the recent Chicago convention of the National Crushed Stone Association. Mr. Brandon uses the films in lectures which he gives farmer audiences on the virtues of agricultural limestone. The interval between exposures is $1/16$ sec. By skipping two and then five exposures the time intervals shown under the pictures were arrived at.

Realizing the value of a laugh and a good-natured audience, Mr. Brandon, who "directed" this movie show, runs this film of the blast. Then he runs a sub-title to the effect that this was a "punk" blast and they will have to try it over. With that is a short strip of film with the "story" reversed. The rocks pick themselves up, reassemble in the quarry face and the smoke of the battle retires to the blast holes! This never fails to raise a laugh.

This, by the way, is only one of many modern ideas that the Ohio Marble Co. has put into practice to sell its various products.

Du Pont Employees Get \$1,448,400 Bonus

THE du Pont Co. has just distributed to its employees 14,484 shares of its own stock, of a par value of \$1,448,400, and \$130,000 in other securities as the matured portion of bonus awards made during 1918 to 1921 inclusive.

This distribution is in line with an amendment recently made to the company's bonus plan, which shortens the period between the bonus award and the delivery of stock certificates. The bonuses awarded for 1922 amounted to 2300 shares, of a par value of \$230,000. They were distributed among 300 employees.

Bonus stock valued at \$20,765,999.50 has been awarded employees by the E. I. du Pont de Nemours & Co. and its predecessor since the inauguration of its bonus plan in 1904. This is an average of more than a million a year. The distribution was begun by the old du Pont Powder Co. and has been continued by the present company.

President Irene du Pont in discussing the awards from an economic standpoint says: "Officers and directors of the com-

pany regard the bonus plan as of inestimable value; it rewards those of the employees deserving more than salary and payroll compensation; it encourages them to further and better effort and secures and retains for the company at highest efficiency the best men in the industry.

"Awards are made among all classes of employees on recommendation of department heads. Each case is considered separately by the executive committee. The result is a distribution which brings into partnership men and women engaged in every line of company effort. The value of the plan is demonstrated by the fact that mainly through its operations, and that of an advantageous stock subscription plan, 27 per cent or 3120 of the stockholders are employees of the company. Many former employees are also among the stockholders."

The 1922 award and future awards will be distributed in installments in three years instead of at the end of five years as heretofore. Certificates for one-fourth of the amount will be issued to the beneficiary at the time the award is made, one-fourth at the end of the first year, one-fourth the second year and the remainder the third year.

A Jolt for the Quarry Man!

Some Sound Criticism and Suggestions for
Raising the Dignity of the Quarry Industry

By R. N. Van Winkle

General Manager, Hawkeye Quarries Co., Cedar Rapids, Iowa

THE quarry business is, as we all know, a basic industry and especially is this true in regard to limestone quarrying, for limestone is fundamental in the manufacture of steel, iron, glass, sugar and a thousand other important and commercially known necessities. Still, by the banker and investor, the quarry business is considered extremely hazardous and unprofitable—in fact, the public at large looks askance upon the whole industry—and well they may, for in most every locality can be found abandoned quarries and crushing plants which are grave danger signals to the banker and the investing public.

The time has come when a hole in the ground or in the side of a hill is no longer worthy of being termed a quarry. The quarrying of stone is fast becoming a highly specialized industry involving, when properly equipped and managed, massive, costly crushers, modern steam shovels, large locomotives, well drills and kindred machinery, operated by trained and highly efficient organizations of real quarrymen. Quarrying is nothing less than open-pit mining, and if the quarrying industry is to survive, prosper and take its rightful place among our basic industries, it is now high time that it be put in a class with mining and other dignified industries instead of being, as it has been in the past, a business in its management and ethics worse by far than the buying and selling of rags and old iron.

Quarry Men Must Sell Themselves on Basic Importance of Their Industry

There is in reality nothing seriously wrong with the stone and quarrying business, as a business. It is legitimate, interesting, and profitable when properly handled; honorable, because it is as old as history itself. The trouble lies, however, not with the business itself, but with the majority of the men engaged in the business. It is a fact that the world moves, and unless you are willing to move with it you may find yourself thrust aside in a way you will not like. So whenever the stone and quarry operator, owner and employee get to the point where they believe they are engaged in an honorable, legitimate industry and are themselves sold on the idea that this industry is as important as coal mining, iron and steel making, and other basic industries, and are furthermore willing, anxious and proud to sell this idea to their friends, neighbors, associates and com-

petitors—then, and only then, will the stone and quarry business take its proper place in our country's industrial scheme.

It has been the writer's experience that

EDITOR'S NOTE

If the article had not come from the pen of an experienced quarry man we would have hesitated to put such "hot stuff" in a paper universally read by quarry owners.

We can't quite agree to such a wholesale indictment of the quarry industry; nevertheless we do recognize big opportunities for its improvement.

The recent convention of the National Crushed Stone Association has thoroughly aroused quarry men to these opportunities; and through the co-operative and co-ordinated efforts of such a national organization as this is bound to become, we look to see the quarry industry recognized both within and without the ranks of quarry men as the premier branch of the great American non-metallic mining industry, of which it is technically a part.—N. C. R.

under the average condition far too much stress has been put upon plant layout and design, when in fact the fundamental thing in the quarry or crushed stone business is the quarry itself.

Business Principles Applied to Quarry Development

Owing to the procedure—or, rather, lack of coherent procedure—followed by so many individuals and companies when entering the quarry and crushed stone business or adding a new operation to their present holding, it may not be out of place to suggest a few simple rules which are worthy of consideration.

First consideration should be given to geographical location, potential market for finished product, and railroad facilities. These things being favorable, it is then highly important to go thoroughly into the deposit, core drilling, prospecting, and making a thorough, comprehensive and exhaus-

tive investigation. Geologists and specially trained men are readily and easily obtainable for this phase of the work, and it is better by far to invest a few hundred dollars for the services of competent talent upon comprehensive investigation than to rush in haphazardly and spend thousands of dollars in a hopeless proposition. A few hundred dollars spent in this way may save you thousands later on in a bad investment.

Being satisfied beyond reasonable question of doubt that you have the geographical location, the market, the proper railroad facilities for handling your output and the proper sort of a stone deposit, the next step is to look around for a competent quarry operator or superintendent. This man is far more important to the ultimate success of a quarry business than any high-powered, high-priced salesman or sales manager on earth. A wonderful crushing plant and an ideal quarry are a liability instead of an asset without a first-class quarry superintendent or operator who understands thoroughly every angle of the business of operation. The production end of your business is the heart of the whole thing. There are, however, many quarry propositions today that are liabilities instead of assets for just this one reason.

After procuring the services of a competent, experienced operator or superintendent you then reach the point where you can with reasonable certainty make definite plans for opening up and working your stone deposit. And it is only after all the foregoing steps have been cautiously taken that your attention should be given to crushing plant.

Designing a crushing plant is a perfectly flexible proposition and should be made to fit your quarry conditions. By this is meant that crushers of ample size should be installed to permit without unnecessary rebreaking the heaviest ledge in your quarry. Screens and other machinery to produce the size of stone your market requires should be installed. In other words, make your crushing plant fit your quarry, as it is impossible to make over the average quarry to suit the plant; many operators have learned this by bitter and costly experience. Many failures in the stone business are directly attributable to this one fact: the plant did not fit the quarry.

Any quarry proposition opened up upon such business-like lines, coupled together

with proper thought and management, will prosper, but it is too often that the crushing plant is the first thing considered. Why? Because in a great many cases a stone company is organized with insufficient capital. As plant designs can be obtained gratis from manufacturers of crushing and screening plant equipment, the parties interested, in their anxiety to conserve their money resources and at the same time make a showing to present and prospective stockholders, accept these plans and proceed with the building of a plant at a quarry location which has never been core drilled or properly prospected. Rather than spend a few hundred dollars for intelligent investigation, they rush in. Consequently, in a year or so, we have another abandoned quarry operation which is an eyesore and a detriment to the quarry industry in general and a danger signal to the banker and investor.

Abandoned Quarries Good Business Prospects

If you will investigate you will find that the average quarry changes hands about three times before it arrives at the point where it is a money-making business. The reason for this is that it ordinarily takes about that many attempts to develop and open up a quarry with the average guess and "By-God" methods that are followed. Therefore my recommendation to the prospective stone-quarry operator, or the operator who wishes to expand, is that—unless he is satisfied to go about opening up a quarry and building a crushing plant in a strictly modern, business-like way—he had better look around and pick up an abandoned quarry where the prospecting has already been done at the expense of someone else; find a location where he can see whether the plant fits the quarry.

Strictly modern and business-like methods are as important in the successful operation of a quarry as they are in the selection of a quarry site and the building of a crushing plant. Strict adherence to labor-saving devices, cost-keeping and organization are absolute necessities. Don't guess. Base your sales price on your production costs, and if your competitor undersells you, he is one of two things, a better operator or a poor keeper of costs. If it is the former, you can undoubtedly learn something from him; if it is the latter, sell him the modern business-like ideas of quarry costs. Show him his errors; this will help him, help you, and the stone industry in general.

Keep Costs and Avoid Waste

Taken, as a whole the quarry and stone crushing business is wasteful, due almost entirely to antiquated methods of field operations, and by field operations are meant operations outside of the crushing plant proper. The waste in dynamite and labor, which are the two ruling factors in quarry production costs, are gigantic, to say nothing of the waste of oil, coal and miscellaneous other supplies. An accurate, simple

and well-balanced monthly cost system is the only method that can be used to correct these excessive expenditures and stop the petty leaks in time to be of any real benefit to the operator.

This cost system need not be elaborate or expensive, nor is it necessary to arrive at a true operating cost. Monthly comparative costs will bring to your attention excessive expenditures and leaks, and a monthly per ton cost, if arrived at each month in exactly the same manner, will give you a comparative cost which, if properly analyzed, will give you the information desired and be of enormous assistance.

Many quarry operators seem satisfied to stay on the job year after year. By this constant, close application they lose all sense of proportion and perspective, and troubles which to them appear small by reason of constant encounter are readily seen by a stranger and outsider as most costly but easily remedied. Welcome visitors and criticisms in your quarry operation and in turn get away from your own operations once in a while and visit your fellow competitor.

You will find that this will not only promote better feeling among stone and quarry operators, but will pay you handsomely for your trouble and expense.

Competition cannot or will not ever be entirely eliminated. This the old-time quarry operator well knows, for where one competitor is eliminated or drops out, it is the general rule you will have one or maybe two new ones to take his place. There is an old saying that you can catch more flies with molasses than vinegar, therefore you should try to educate your competitor instead of fighting him. While doing this, remember that your competitor is human, the same as you are, and having his money invested here, after all is said and done, has as much right in the stone and quarry business as you have.

Co-operation in its broadest sense, leadership, modern business methods and practices are the things that will gain for the quarry industry its proper place in the minds of the banker and the public and it will also bring to the quarry operator and owner a new era—a feeling of pride instead of regret in being engaged in this basic industry.

A. W. Catlin Joins Waller Crow, Inc., Organization

IN an executive capacity, with title of vice-president, A. W. Catlin, well known here and abroad, has joined the



A. W. Catlin

Waller Crow, Inc., organization, Chicago.

Mr. Catlin is a mining engineer, class of 1897, of the College of Montana. He was consulting engineer on mechanical and electrical work and sales engineer for various large organizations from 1897 to 1906. From 1906 to 1916, among other notable achievements he was assistant to

the general European manager for Fraser & Chalmers, Ltd., of London, which concern later disposed of their interests to the General Electric Co., Ltd., of England.

His experience comprises mining, metallurgy, combustion, mechanical and electrical engineering, including special plant designs, also steam turbines, gas cleaning, dredging, Diesel engine and hydraulic experience. He has many successful plants to his credit in foreign countries and is an authority on European industrial methods and practices.

Mr. Catlin re-designed the plant of the Cia. General de Asfaltos y Portland (Asland) Cement plant, Barcelona, Spain and has supervised construction and remodeling of many large industrial plants in Europe as well as in the United States. Among them are the Ebro Irrigation and Power Co.'s cement plant, Spain; Aberthaw and Rhose Portland Cement Co.'s stone-crushing plant at Cardiff, Wales; French Government naval basins; stone-crushing plant, Toulon, France; Tscheliabinsk Gold Mining Co., gold milling plant employing the cyanide process at Tscheliabinsk, Russia.

He is a member of many notable European clubs including the New English Club, Petrograd, Russia, and the Mining and Metallurgical Club of London, England. He is a linguist of rare attainments and will be a very valuable addition to this organization.

While Mr. Catlin's experience may appear to be largely international, yet his operations in the U. S. and his examinations of phosphate, cement, coal, clay and other properties in this country have been numerous and have covered a wide range.

Progress of Rock Products Industries in the South

General Building and Good Roads Programs Cause Unprecedented Activity Among Southern Producers

By George M. Earnshaw
Associate Editor, Rock Products

FROM Florida to Indiana, by way of the most important cities of those two states, Georgia, Alabama, western Tennessee and Kentucky, I have witnessed unusual activity in the rock products industries. This fact naturally forces the conclusion that the building boom is not confined to particular sections and that such a condition insures prosperity in some degree for all producers in our industries.

Phosphate and Lime Producers Optimistic

Nor is this movement confined to aggregate producers, for the lime operations and phosphate mines also are confronted with the same problem—that of supplying a demand which their present plants are incapable of fulfilling. Even in the largest phosphate district of Florida, with its million-dollar plants, I found the officials adding new washing units and railway equipment for handling the material between the mines and storage.

In Tennessee a pebble-phosphate company was reconstructing its plant—doubling the capacity.

In Shelby county, Alabama, practically every lime producer of that district whom I interviewed was "head over heels" in work and considerably worried while trying to continue the operation of his plant, at the same time building new kilns, adding hydrating equipment and erecting new buildings. Within this county is one of the richest deposits of limestone in the state, and its present number of operations is insufficient to supply the demand in the territory it controls. This is proven by the fact that one of the pioneer companies of the district has reorganized and has drawn up plans and let contracts for a 10-kiln plant estimated to cost over \$1,000,000. Ground will be broken for this new operation on or before April 15.

Extensive Building Programs

In Atlanta, Birmingham and Memphis aggregate producers have all the business they can handle. The year 1923 was apparently drawn from a hat as the year for building new hotels, churches, schools, office buildings and buildings of all kinds in these cities.

I was particularly impressed with activity in and around Birmingham, as I had an advantage there in looking over the rock products industries as well as the progress of that city's general building program. Among other courtesies extended me by the Birmingham Slag Co., it was my pleasure to have that company arrange for me an aeroplane trip over the city and its outskirts. I am safe in saying that in every one of 7 out of 10 city squares we flew over there were one or more buildings in course of construction.

As we passed over the Phoenix and Lehigh cement plants, which are nearing completion, it was indeed easy to realize that their erection was justifiable, after having just gazed on hundreds of buildings being wholly or partly constructed of concrete.

Four New Cement Plants

With four new mills under construction, it is not probable that the South will suffer the usual shortage of cement during the peak season this year, as at least three of these new plants are expected to produce not later than August 1.

These four plants—the Signal Mountain at Chattanooga, the Hermitage at Nashville, and the Phoenix and Lehigh at Birmingham—will have a combined output of more than 12,000 bbl. daily, practically all of which will be consumed in the territory of each respective plant.

In addition to these plants, it has been recently announced that still another plant is to be built in the South. This plant is to be erected at Ainsley, Ga., by the Southeastern Portland Cement Co. The output of this plant, together with that of the Southern States Portland Cement Co. at Rockmart, Ga., will undoubtedly take care of the requirements of southern Georgia and Florida and will not darken the prospects of the other new plants farther north.

Other Aggregate Men Active

It is natural that if the construction program of the South warrants such an increased production of cement, the producers of sand and coarse aggregate also are justified in increasing capacities. They all realize it. At Montgomery, Birmingham, Memphis

and Louisville operators are either building complete additional units or remodeling their plants for increased capacities. This activity is apparent not only at sand and gravel operations but at slag and stone plants as well. Embodied in the plans of the new lime company at Calera, Ala., are plans for a 2000-ton-per-day crushed stone plant which will be the largest operation of its kind in the South.

The unusual strides being taken by our industries in this section are no doubt in harmony with the advance of the rock products industries of the entire country, and more than ever it will soon be an honor and distinction to be connected with them.

Other Southern Activities—Phosphate, Rock Asphalt and Cement

Rebuilding the second washing and screening unit of the Charleston, S. C., Mining and Mfg. Co.'s plant at Mt. Pleasant, Tenn., has been completed and it will begin operating as soon as minor installation details have been completed. This unit, together with the one now in use, and similar in design, will comprise the primary separation and washing process of the operation.

In addition to the primary washing units, there will be two batteries of rinsing and settling tanks, each battery comprising one 16, one 12 and one 10-ft. rinsing tank and one 8-ft. de-watering tank. From this battery the overflow will be sluiced to an 80-ft. Dorr thickener and thence through a third battery of tanks arranged in similar manner to the other batteries.

Drying equipment includes four 50x5-ft. rotary driers, the product being removed to a 10,000-ton capacity storage by trolley and distributed according to grade. The finished material will be taken from storage by an underground conveyor discharging either into box car loaders to be loaded for shipment or into a cross conveyor leading to a grinding plant. As the demand for pulverized material is relatively small, the storage accommodation is small in proportion. Two 42-in. Fuller-Lehigh mills comprise the equipment of the grinding plant. When completed the operation will have a monthly capacity of 10,000 tons, which will be double the output of the original plant. The recon-

struction is under the supervision of P. H. Haskell, operating manager, and it is expected to have the entire operation functioning not later than June 1.

New Cement Plant for Nashville

Ground was broken for the foundation of the 2000-bbl. plant of the Hermitage Portland Cement Co., at Nashville, Tenn., on March 27, and a construction program has been outlined which calls for the completion of the new plant in August.

All machinery contracts have been placed and arrangements completed which assure deliveries of equipment as fast as the foundations are ready for service.

This wet-process plant will be similar in design to that of the Petoskey Portland Cement Co., at Petoskey, Mich., having two 10x150-ft. kilns equipped with 8x60-ft. coolers and one 175-ft. concrete stack. The Allis-Chalmers Co. has been awarded contracts for the major portion of the machinery.

As Nashville proper provides a market for 150,000 bbl. of cement annually, the company has listed as necessary equipment, a large fleet of five-ton motor trucks. Deliveries will be made on a mileage basis direct to all jobs within reasonable hauling distance where the contractors do not have available trucks of their own.

President Vance of the John C. Vance Iron and Steel Co., Chattanooga, is president of the company; T. L. Herbert, Jr., is vice-president, and R. D. Herbert secretary-treasurer, both of Nashville. R. T. Miller, formerly with the Pittsburgh Testing Laboratory as general manager of the Chicago office, will manage the company and supervise the construction and the operation of the plant upon its completion.

Kentucky Rock Asphalt Co. Remodeling Plant

The Kentucky Rock Asphalt Co.'s crushing plant at Kyrock, Ky., is being reconstructed to eliminate man-power in the quarry and increase production approximately 20 per cent. Formerly, the rock was broken by hand in the quarry to hand-loading size and was received by a 50x22-in. primary jaw crusher. This disadvantage will be overcome by the installation of a 48x60-in. jaw crusher and derricks in the quarry to load large sizes into cars. The new primary breaker will discharge on a 30-in. belt conveyor of 580-ft. centers which will discharge either direct into the former primary crusher or into a 2500-ton ground storage. With the exception of an additional 24x54-in. Anaconda roll crusher, the design of the original plant will be unchanged.

The new design is credited to Brownell McGrew, of the Allis-Chalmers Mfg. Co., and Wallace L. Caldwell, president and general manager of the Kentucky company. Mr. Caldwell will supervise the new work. He expects to have the plant operating by May 1, with a daily output of 1500 tons.

\$3,000,000 Cement Company Organized

Announcement is made by the local press of the organization at Macon, Ga., of the Southeastern Portland Cement Co., with a capital stock of \$3,000,000. What is said to be one of the richest limestone deposits of the South has been found near Ainsley, Ga., 28 miles south of Macon. The plant proper will be erected near Ainsley, with main offices at Macon.

W. Jordan Massee, president of the new company, is also the head of the Bibb Brick Co. of Macon. George P. Dickmann, chemical engineer, formerly connected with the Gulf States Portland Cement Co. in the capacity of general manager, is vice-president and general manager, and E. E. Satterfield, Macon capitalist, is secretary-treasurer. The directors include the officers of the company and H. O. Reeve and George H. West, both of Atlanta.

Another Big Gypsum Combine

Acme Cement Plaster Co. Absorbed by Certainteed Products Co.

ONE of the largest transactions in the history of the gypsum industry has just been consummated by which the several gypsum-products manufacturing plants of the Acme Cement Plaster Co., including those at Acme, Texas, and at points in Iowa, New Mexico, Oklahoma, Oregon, Michigan and Wyoming pass into the hands of the Certainteed Products Co. of New York and St. Louis. The consideration has not been made public but it is said to run to several million dollars.

The purchase also includes large deposits of gypsum in various parts of the country, amounting to several thousand acres.

The Acme Cement Co. was formed about 25 years ago to develop the gypsum deposits near Acme, Texas. Sam Lazarus of St. Louis, Mo., was largely interested in the enterprise, and this fact led to his construction of the Quanah, Acme & Pacific railroad which affords a railroad shipping outlet for the industry. It is stated that the Certainteed Products Co. will increase the capacity of the mills here.

The officers of the American Cement Plaster Co. are Sam Lazarus, president; vice-presidents, S. A. Walker, Leo Jacobs, and Ray C. Haynes; secretary, J. J. Clark; treasurer, E. H. Wischler. The main offices are at St. Louis, Mo. Mr. Haynes is the president of the Gypsum Industries, Inc., successor to the Gypsum Industries Association.

This makes the second large gypsum products concern to be absorbed by a national building products manufacturer; the other being the American Cement Plaster Co. which was absorbed by the Beaver Products Co. of Buffalo, N. Y., about a year ago. These two companies probably control from a quarter to a third of the gypsum industry of the United States, the United States Gypsum Co. controlling another third.

Apparently the real meaning of these great consolidations to the gypsum industry

is the growing recognition of plaster wall board as the ultimate wall-covering material. Now three of the strongest sales organizations in the building material field—national advertisers on an enormous scale—are devoting increasing energies to promoting the use of gypsum wall board and other manufactured gypsum products.

New Rock Asphalt Plant for Kentucky

WORK has been started on the new plant of the Ohio Valley Rock Asphalt Co. at Summitt, Hardin county, Kentucky, and the officials have announced that, with favorable weather conditions, production will be attained not later than June 1.

This plant, which will be one of the largest and most up-to-date of its kind in this country, will have as its primary crushing unit a 36x48-in. jaw crusher, thus permitting the use of power shovels in the quarry for loading. Secondary breaking units will comprise Anaconda rolls and pulverizing equipment capable of producing 500 tons per day. The entire operation, exclusive of quarry-transportation and excavating equipment, will be powered by one 300-hp. oil-burning engine.

Direct supervision of the construction is in the hands of Dover Williams, vice-president and general superintendent. Rodman Wiley of the firm of Billiter & Wiley, Cincinnati, has been retained as consulting engineer. The general plan and details of design were made by President F. B. Wood and the Traylor Engineering and Manufacturing Co., Allentown, Pa. Mr. Wood was formerly president and general manager of the Kentucky Rock Asphalt Co., Kyrock, Ky. S. O. Lesuer is secretary-treasurer. The main offices are at 1012 Starck building, Louisville.

Constitution of a Chinese Portland Cement Corporation

Together with Costs of Cement Manufacture in the Far East

THROUGH the courtesy of W. H. Chou, sales manager of the Ta Hu Cement Co., Ltd., Wusieh, China, Rock Products is permitted to reproduce herewith the constitution of that corporation, which, as the reader will note, is an interesting sidelight on Chinese business methods and organization, and on the portland cement industry of that country. Mr. Chou has also supplied the cost figures for the manufacture of portland cement in China.

The Constitution of the Ta Hu Cement Co., Ltd.

ARTICLE I: The name of this Company shall be called the Ta Hu Cement Company Ltd. registered in the Ministry of Agriculture and Commerce.

ARTICLE II: The object of this Company is to manufacture Cement and its allied products.

ARTICLE III: The period of operation of this Company shall be sixty years unless extended by the decision of the Board of Directors.

ARTICLE IV: The factory and head office of the Company shall be located in Wusieh. The branch factory and other branch offices shall be established at the proper places in the time to come.

ARTICLE V: The Company is capitalized at the total sum of two million and five hundred thousand dollars. One million and five hundred thousand dollars shall be first subscribed. The remaining one million dollars will be called in at the decision of the Board of Directors.

ARTICLE VI: The privilege of subscribing for the shares of this Company shall be limited only to the citizens of the Chinese Republic.

ARTICLE VII: In case of transference of any of the stocks the name of the transferer and that of the transferee shall be registered on the back of the stock certificate. This transaction shall be reported to the Company. But no one is allowed to transfer his or her stocks one month prior to the meeting of the stock holders. New stock certificate shall be issued to the transferee. For this work a small fee of twenty cents shall be charged.

ARTICLE VIII: The annual interest of the stock shall be 8%. But no interest shall be paid out of the capital.

ARTICLE IX: The Board of Directors shall choose a General Manager and a Vice-Manager of the Company. Other Assistant managers may be added to fill the needs of the Company.

ARTICLE X: The General Manager shall have the power to represent the Company and employ all the employee of the Company. The Vice-Manager shall assist the Manager in discharging all his duties.

ARTICLE XI: The Company shall provide a Board of Directors consisting of nine members and two Auditors. Only those who

have 1000 shares of stock are qualified to serve in the Board of Directors and those who have 500 shares are qualified to serve as Auditors. The number of Directors shall be increased by the decision of all stock holders according to the needs of the Company.

ARTICLE XII: The Board of Directors shall serve for three years. The Auditors shall serve for one year. Both the Directors and Auditors are eligible for re-election.

ARTICLE XIII: The Chairman and Vice-Chairman of the Board of Directors shall be elected by the Board of Directors.

ARTICLE XIV: The stock holders' meetings shall be divided into two kinds:

- (a) Annual stock holders' meeting.
- (b) Special stock holders' meeting.

ARTICLE XV: The annual stock holders' meeting shall be called by the Manager in March at the headquarters of the Company.

The special stock holders' meeting shall be called by the Manager at the discretion of the Manager and the Vice-Manager or at the decision of the Board of Directors or the auditors or at the petition of one-tenth of the total membership of the stock holders.

ARTICLE XVI: One month prior to the stockholders' meeting, the stockholders shall be notified of all the proposals to be brought out in that meeting.

ARTICLE XVII: In case of absence, the voting power of the stockholder shall be delegated to some other stockholder with the properly chopped certificate.

ARTICLE XVIII: In the stockholders' meeting one share counts as one vote. The Manager shall act as the presiding officer of the meeting. In case of absence, the Vice-Manager shall act in place of the Manager.

ARTICLE XIX: The accounts of the Company shall be cleared up at the end of the year according to the Solar calendar.

ARTICLE XX: A report on the business of the year, and the profit and loss of the Company shall be presented to the stockholders' meeting by the Board of Directors after being examined by the Auditors.

ARTICLE XXI: A certain percentage of the profit made by the Company shall be set aside to cover depreciation of the machinery of the Company.

ARTICLE XXII: One tenth of the total net profit shall be set aside by the Company as the Reserve Fund. Then the annual interest on the stocks shall be paid out of the profit. Whatever is remaining shall be divided into 15 parts. One part-and-a-half shall be set aside as the Special Reserve Fund, ten parts as the bonus to the stockholders, three parts as the bonus to the employees and a half-part as the Sanitary Expense for the workmen.

ARTICLE XXIII: Any notification of the Company shall be communicated to the stockholders both by letter and by the announcement in certain designated newspapers.

ARTICLE XXIV: Any amendment to the constitution of the Company shall be initiated and presented by the Board of Directors to the stockholders' meeting. If approved, it shall become a part thereof.

ARTICLE XXV: This constitution of the Company is in effect by the order of the Ministry of Agriculture and Commerce.

Cost of Manufacturing Portland Cement in China

(a) The following quantities of the raw materials are needed for making 2000 barrels of cement per day:

Limestone—1,000,000 lbs. = 7500 piculs (one picul equivalent to 133½ lbs.).
Claystone—283,200 lbs. = 2124 piculs.
Gypsum—16,000 lbs. = 120 piculs.
Coal—350,000 lbs. = 175 tons (each ton = 3000 lbs.).

(b) The price of the raw materials is as follows:

Limestone per picul \$0.742.....	7500 piculs	\$556.50
Claystone per picul \$0.15.....	2124 piculs	31.86
Gypsum per picul \$2.00.....	120 piculs	240.00
Coal per ton \$12.00.....	175 tons	2100.00
Total.....		\$2928.36

Explanation: It costs \$17.00 to ship 400 piculs limestone from Nee Hsin. It further costs \$10.20 for the people to excavate 400 tons of limestone and ship them to the boat. The cost of lifting up the limestone from the boat is \$3.20. The total expense is \$30.40 for 400 piculs of limestone. It costs \$0.76 per picul of limestone.

It costs \$21.00 to ship 30 tons of limestone from Tungtin Hill. It costs \$11.50 for excavation. It costs \$4.00 to lift up the limestone from the boat. The total expense is \$36.50 for 30 tons. It costs \$0.725 per picul of limestone.

By averaging the price of limestone from Nee Hsin and that of limestone from Tungtin Hill, we get the price of one picul of limestone at \$0.725.

The coal price is based upon the wholesale price of Chung Hsin coal in Wusieh.

The price of gypsum is based upon market price in Wusieh.

The price of claystone is based upon the expense for excavation by ordinary laborers. The total cost for the raw materials for 600,000 barrels of cement is \$878,508.00.

The other estimated expenses for the whole year are as follows:

(1) Cost for raw materials is.....	\$878,500.00
(2) Cost for making 600,000 casks is	360,000.00
(3) Addition for machinery parts, belt, steel and other miscellaneous things	100,000.00
(4) Administration expense \$8000 per month	96,000.00
(5) Wage of 600 workmen for both day and night work (each 50c)	108,000.00
(6) Wages of 100 of mechanic and other technical men (each is supposed to receive an average salary of \$60.00 a month)	72,000.00
(7) Annual interest on the stocks (\$1,500,000.00) at the rate of 8%	120,000.00
(8) Depreciation on the machinery (\$1,200,000.00) at the rate of 6%	72,000.00
(9) Insurance on the whole factory and machinery (at the value of \$1,200,000.00)	4,000.00
(10) Other miscellaneous expense.....	36,000.00
Total.....	\$1,947,308.00
The net profit made is.....	\$1,052,692.00

New Crushed Stone Association Memberships Up to March 26

MEMBERSHIP in the National Crushed Stone Association is steadily increasing, the following names having been added according to the latest bulletin from the secretary's office:

Names	Number memberships
General Crushed Stone Co., Easton, Pa.	8
France Stone Co., Toledo, Ohio.	5
Callanan Improvement Co., Albany, N. Y.	2
Wallace Stone Co., Bay Port, Mich.	2
Raleigh Granite Co., Raleigh, N. C.	2
Woodville Lime Products Co., Toledo, Ohio.	2
Templeton Limestone Co., Kittanning, Pa.	2
Holston Quarry Co., Knoxville, Tenn.	1
Thomas Sullivan, Omaha, Neb.	1
Collins Granite Co., Inc., Danville, Va.	1
Northwestern Quarry Co., Rapid City, S. D.	1
New Castle Lime and Stone Co., New Castle, Pa.	1
Total	28

The addition of these 28 new members now brings the total membership of the association up to 162 members.

International Cement Plants Running at Record Rate

ORDERS and production of the International Cement Corp., New York City, are running at record rate for this time of the year, and all indications are that 1923 will be its best year. The annual report will show earnings after preferred dividends slightly in excess of \$4 a share on 323,978 shares of common stock. For the final three months of 1922 net was at the rate of \$5 a common share.

Its mills are operating at highest efficiency, and it is believed that this year production will be maintained up to capacity, estimated to be in excess of 5,100,000 bbl.

Improvements at the Knickerbocker property are about completed and should enable that plant to produce its annual capacity of 1,500,000 bbl. The Texan plants are expected to continue production at maximum rate. The recently acquired Kansas plant, now being enlarged, is producing beyond previous expectations, while its Cuban property capacity will soon be increased by a third kiln. The South American subsidiaries continue to improve.

Geological Report on Kentucky Road Material

THE Kentucky Highway Commission and the Department of Geology have made arrangements for Charles H. Richardson of the department of geology of Syracuse University, in New York state, to make a report on road-building materials for that state.

Mr. Richardson recently made a report on glass sands and building stones for Kentucky. He is considered a high authority on these subjects.

Safety Engineers Meet at Chicago

A MID-YEAR safety conference has been called by the Engineering Section of the National Safety Council at Chicago, April 17, in the auditorium of the Western Society of Engineers, 53 West Jackson boulevard. Handling material, dust and fume hazards, and traffic safety are the three main topics on the program.

The morning session will deal with causes of accidents in handling materials, and use of conveyors and trucks in eliminating material handling accidents, followed by a general discussion of specific safety problems in material handling. George T. Fonda, of Fonda-Tolsted, Inc., Washington, chairman of the Engineering Section of the Council, will preside at the morning meeting.

Preventing dust fires and explosions, health protection against dust, and a discussion of practical methods of dust and fume removal will follow in the afternoon. Homer E. Niesz, Commonwealth Edison Co., Chicago, and treasurer of the National Safety Council, will preside at the banquet in the evening, at which traffic problems will be discussed.

Eden Analyzes Cement Situation in Washington State

AN analysis of the portland cement situation for western Washington during 1923, states John C. Eden, president of the Superior Portland Cement Co., Seattle, Wash., naturally separates into three principal divisions: supply and demand, price, delivery.

"Our producing mills have a capacity more than equal to the possible demands of the territory, and there is on hand, and being manufactured, cement enough to meet all requirements. All plants are operating at full capacity, filling the huge storehouses in preparation for the increased demands of the summer months. Seventy per cent of our deliveries are made in the six months between May and November. At our mill at Concrete, Wash., we have just completed the construction of a clinker storage building, increasing our storage capacity to 250,000 bbl.

"Present conditions indicate that the demand during 1923 will be heavier than it was last year, which was the second normal year we have had since 1913. Commercial and industrial building promises to increase; home and apartment construction will undoubtedly be as large. The road-building program may not show a great decrease. We have anticipated future costs as much as possible, and hope during 1923 not to be compelled, through advance in manufacturing costs, to raise our selling price above its present comparatively low base. This means that contractors are in position to foresee clearly what the cost of cement will

be and can lay their plans accordingly.

"The most serious factor that might affect the cement market is transportation. Car shortages have been the rule, rather than the exception, during the 16 years we have been manufacturing cement. Last year work involving the use of 100,000 bbl. of cement was postponed due to car shortage. This year we have endeavored to forestall the possibility of a car shortage affecting our customers and have purchased 60 railroad cars.

"We cannot look forward to 1923 with other than optimism for those engaged in the manufacture, sale, and use of cement."

A Financial Editor on a Crushed-Stone Security

REPLYING to an inquiry about the new \$2,000,000 bond issue of the Kelley Island Lime and Transport Co., noted in the March 24 issue of Rock Products, the financial editor of the Chicago Tribune notes in its issue of March 27:

The Kelley Island Lime and Transport Co. is a large producer of crushed stone, with properties located in seven cities in Ohio, two in New York state, one in Michigan, and one in Indiana. It is issuing \$2,000,000 10-year 6 per cent debentures. These are unsecured, but the company agrees not to mortgage any of its fixed property while any of these debentures are outstanding without giving equal security to the debentures. The balance sheet as of January 1, 1923, after giving effect to this financing, shows a net worth, after deducting all liabilities except this issue, of \$10,810,272, and net current assets (including stocks held of other corporations) of \$3,161,514, or 1.58 times these debentures. Net profits after all charges for the last 23 years have averaged \$540,789, or over four and one-half times annual interest charges on the present issue and, for the last nine years, \$721,175, or over six times such charges. These debentures constitute the sole funded debt. They are followed by \$7,744,700 capital stock, paying 8 per cent dividends. The stock has paid at least 8 per cent per annum for the last 21 years. These debentures are a high-grade investment, suitable for a business man's funds.

Large Crushing Plant for Sacramento County

UNDER the name of Pratt Rock and Gravel Co., Clarence F. Pratt, president of the Pratt Building Materials Co., with offices at Sacramento, Marysville, San Francisco and Prattco, Monterey county, announces that his company will build a \$200,000 rock and gravel crushing plant between Sacramento and Folsom, near the Placerville branch of the Southern Pacific.

The new company will crush the boulders and rocks thrown up by the dredgers in the Folsom district. As told in Rock Products for March 12, 1921, similar plants have produced millions of tons of rock, which for years were waste on the placer-mine dumps, but today furnish material for the rock products industry in

California. This by-product of placer mining has found notable use in the operations of the Natomas Co., of California, the plant and operations being described at length in the issue referred to.

Control of Woodville Lime Co. Decided

IN the suit of John J. and William Urschel for control of the Woodville Lime Co., Toledo, Ohio, which has been in the courts the past two years, the Supreme Court has decided in favor of John J. Urschel and his son George, says the *Toledo Blade*.

"The fight came to a climax," states the *Blade*, "when William L. Urschel bought a majority of the preferred stock and sought to control the corporation by voting it. J. J. and George Urschel, with Gustave Faist, constituting a majority of the board of directors, refused to allow the preferred stock to vote.

"In the legal action that followed, the Supreme Court held that the preferred stock had voting rights and the W. L. Urschel faction seemingly had control of the company, the court ordering an election to determine the new directorate.

"J. J. and George Urschel and Faist, as a majority of the board of directors, met and redeemed and canceled the preferred stock so that when the time came for the election the president announced that there was no preferred stock outstanding. Additional briefs were filed and argued before the Supreme Court. In its decision the court held that the redemption of the preferred stock was valid."

Would Tax Sand and Gravel 50 Cents a Ton

A BILL has been introduced in the West Virginia legislature whereby a tax of 50 cents a ton on sand and gravel is to be levied on those materials mined or dredged from the Ohio river to the low-water mark on the Ohio side. Among those who would be affected are the Armstrong Sand and Gravel Co. and the Wheeling Wall Plaster Co.

The first section provides that "it shall be unlawful for any person, firm or corporation to take from within or beneath the bed of the Ohio river any sand or gravel from any lands lying in the bed of the river except in accordance with the provisions of the bill." Section 2 provides that whoever desires "to take from the Ohio river any of such sand or gravel they shall first obtain the consent of the State Road Commission and shall pay to the commission 50 cents a ton for the sand and gravel so taken and such sand and gravel shall be taken under such terms and conditions as the State Road Commission may determine." This section

also stipulates that no contract shall be entered into giving the exclusive privilege of making purchases under the terms of the proposed act. There is also a proviso that nothing shall prevent the road commission from taking without payment any sand or gravel to be used exclusively for the construction and improvement of the public highways of the state.

Section 3 makes the road commission custodian of all sand and gravel and authorizes it to buy and build necessary dredges, boats barges and other machinery for use in building and maintaining the public highways. The commission is also authorized to build loading plants on the Ohio river at economical shipping locations for the purpose of receiving sand and gravel from its plants. The commission is also authorized to buy.

Section 5 provides that any company taking sand and gravel from the Ohio river at the time of the taking effect of the proposed act shall be permitted to continue taking such material provided that all those so engaged shall pay the road commission 50 cents per ton.

Section 8 stipulates that the net proceeds derived from the sale of such sand and gravel shall be paid to the state treasurer under such regulations as the state road commission shall provide and shall inure to the state road fund. Penalties for violations of the proposed act are a fine of not less than \$1000 nor more than \$5000.

Work Progressing on South Dakota's State Cement Plant

THE work on the state-owned cement plant to be erected by the South Dakota State Cement Commission, near Rapid City, is progressing, and Secretary A. C. Hunt of the commission has advertised bids for the new structures. The J. C. Buckbee Co., Chicago, are the engineers.

The plans call for a raw-material storage building 80x408 ft., a main mill building 50x512 ft., two motor buildings 20x50 ft., a coal mill building 50x72 ft., a shop and warehouse building 67x112 ft., a blacksmith shop 27x29 ft., and a bag storage building 54x98 ft. Flat reinforced concrete roofing tile will cover these buildings.

Other structures include a 205-ft. reinforced concrete chimney 10 ft. in diameter, a one-story brick office, laboratory and employees' locker room building, 62x80 ft.; a one-story brick shop and warehouse, 67x122 ft.; a one-story and basement brick bag, storage and cleaning building, 54x98 ft.; a reinforced concrete finished cement storage building consisting of six 32 ft. diameter by 70 ft. high tanks, cement packing-house and accessories; and a raw-material storage building, with concrete foundation, 80x408 ft.

The plans may be seen at the offices of the J. C. Buckbee Co. in the First National

Bank building, Chicago, and at the office of the secretary of the Associated Contractors of South Dakota at Aberdeen.

Virginia Corporation Commission Approves Many Freight Rate Cuts

AMONG the freight rate reductions recently filed by the railroads and approved by the Virginia Corporation Commission were the following:

Stone, rubble and crushed, carloads, Ripplemead to Norfolk, via Norfolk & Western. Slag, lump or crushed (not ground or pulverized), carloads, between Southern railway stations, in Virginia.

Sand and gravel, Puddledock to Clifton Forge and Covington, via Norfolk & Western and Chesapeake & Ohio.

Sand and gravel, carloads from Ellerslie to Drivers, Norfolk, Suffolk, Shoulders' Hill, Wilroys, Fort Monroe, Hampton, Newport News, Phoebus, Farmville, Grove, Hopewell, Lee Hall, Lynchburg, Roanoke and Salem, via Atlantic Coast Line and connections.

Stone, crushed carloads, Ripplemead to Roanoke, Pierpont, Salem and Suffolk, via Norfolk & Western.

Columbia Quarries Co. Buys Its Eighth Quarry

"OUR company has just purchased its eighth quarry," said J. H. Heintz, sales manager of the Columbia Quarries Co., of St. Louis, while paying Rock Products a visit on April 2. "The new quarry is at Grafton. An entirely new plant will be installed before we start operations. We look for the biggest business in our history during the year."

The company's quarry at Krause now has a No. 18 crusher in place of the old No. 12 and will be ready to operate in about three weeks.

Mr. Heintz is a civil engineer by profession. He wears the service button of the overseas veteran, having been in the air service and performing unattached duty in England for seven months.

Crushing Plant for Catalina Island

ALEASE has been signed by the Graham Brothers, of Long Beach, Calif. whereby the lessors, the Wilmington Transportation Co., operating the Catalina Island Line from Los Angeles to Avalon, give authority to the Graham Brothers to open up quarry sites and provide transportation for a crushing carrying system between the island and the harbor district.

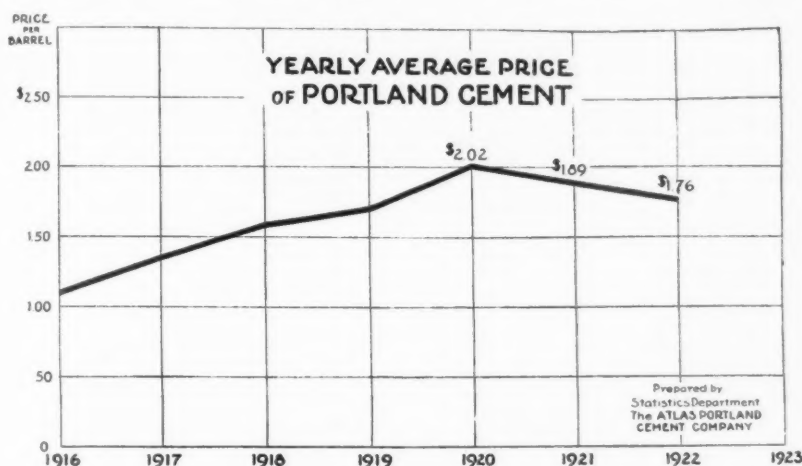
A \$40,000 crusher plant, with a capacity of 3000 tons, a terminal at Long Beach, \$100,000 worth of barge and building equipment and a storage yard on Mormon Island, are included in the plans.

Yearly Average Price of Cement

PORTLAND cement declined in price from \$1.89 a barrel in 1921 to \$1.76 in 1922, according to the latest figures compiled by the United States Geological Survey, not heretofore made public.

Shipments for January and February this year indicate that the consumption of cement in 1923 will be even greater than last year. In these two months shipments totalled 11,382,000 bbl. as against a total of 6,216,000 bbl. in January and February, 1922, and 5,870,000 bbl. in 1921.

To take care of the increased demand for cement which is looked for in 1923, present plans call for seven new mills of substantial capacity to be in operation this year, which, with a number of smaller units, should increase the country's capacity to 150,000,000 bbl. It is estimated that actual production will be 20,000,000 to 25,000,000 bbl. over 1922.



There should be no shortage of portland cement this year providing purchasers do not concentrate their orders in the peak months of July, August, September and October. Production during the first two months of this year totalled 15,789,000 bbl. as against 8,569,000 bbl. in the first two months of 1922, and 8,477,000 in January and February, 1921. Any reasonable increase in the demand for the product can be met by the country's present mill capacity.

Although the cement shipments in 1922 were the greatest in the history of the industry, they were still 30,000,000 bbl. below the country's productive capacity.

"National Campaigns That Bring Business"

UNDER the above caption, Secretary T. R. Barrows of the National Sand and Gravel Association has a most interesting and instructive article in the April issue of *Building*, the official publication of the Philadelphia Builders' Exchange and Employers' Association.

This article tells the readers how his association obtained relief for its members from car shortage, how it is promoting the use of material, and contains a brief history of the association. It is a fine presentation of the brief for the sand and gravel producers and reflects great credit upon Secretary Barrows as an able attorney for his case.

Negro Labor Being Lured from Florida Phosphate Mines

PROOF of the growing shortage of labor comes from the southern most corner of the country. What will happen nearer home in a few months is a question.

A news dispatch from Bartow, Fla., reads:

That the labor shortage is being felt in the vicinity of Bartow was made manifest when W. E. Eger, manager of the Morris phosphate mines, appeared before the city commission to complain that negro laborers were being lured from Bartow, making it hard for the phosphate mines in Polk county to find men necessary to operate to capacity and to ask that steps be taken to prevent labor agents from establishing offices in the city through which to drain the surrounding country of laborers.

"Blacks are leaving this section by train and by truck daily," said Mr. Eger, "lured by offers of what to them are tremendous wages. I understand that they are being offered \$4 and \$5 even more per day. They don't seem to realize that even if they are paid those fabulous figures, they will be required to pay higher rents, wear more expensive clothing and pay a heavy percentage of their earnings for fuel and will have much less left than though they remained in Florida at Florida wages. What is needed is a campaign of education among them which will have the effect to impress its true knowledge of what the change in environment will mean to them in the last analysis."

It was suggested that an ordinance might be passed placing a heavy license tax upon labor agents, though it was doubted that it would be effective under the circumstances which prevail in Bartow at present.

The "Sauerman News"

A MONTHLY bulletin of information on cableway excavators and power drag scrapers is published by Sauerman Brothers, 430 South Clinton street, Chicago. We have No. 3 of Volume 1 before us. It contains 16 pages of instructive matter, interestingly written and presented to those readers with whom the company desires to establish "a better appreciation of Sauerman equipment."

If any ROCK PRODUCTS reader wishes to have this little magazine come to him regularly, all he has to do is to send his request to the above address and his name will be placed on the permanent mailing list. There is no charge. Louis McLouth is the editor.

Kentucky County Leases Crusher to Regular Operator

FAYETTE county, Kentucky, of which Lexington is the county seat, has found a way to own a quarry and crushing plant and operate it right. Realizing the county highway engineers are not quarry and crushing-plant operators any more than crushing-plant operators are highway engineers, the county is wisely deciding to let a regular quarry man operate its plant.

Sealed bids were recently received by County Road Engineer W. H. Edwards for quarrying, crushing and putting into bins 15,000 tons of rock at the Viley station rock-crushing plant, the rock to be taken from the county quarry at that point.

The bids received were as follows:

B. T. Moynahan, 88 cents per ton and 13 cents per ton, payable to the county for use of machinery and quarry.

Luke Smith, 87 cents per ton and 15 cents per ton, payable to the county for the use of machinery and quarry.

Richard Hager, \$1 per ton and nothing to the county stipulated for the use of the machinery and quarry.

Lancaster & Coyle, \$1.15 per ton and 25 cents a ton to the county for use of machinery and quarry.

What Pennsylvania's 1923 Repair Materials Would Cover

MATERIALS to be used by the Pennsylvania State Highway Department in its repair work for the 1923 season will load 113 freight trains averaging 100 cars each, which, if placed together, would reach from Harrisburg to within a few miles of Williamsport, the department announces.

The stone would build a rock fence 3½ ft. high and 370 miles long, making a wall extending along the Lincoln highway from Philadelphia through Pittsburgh and to a point near Greenville.

Traffic and Transportation

By EDWIN BROOKER
Munsey Building, Washington, D. C.

Southwestern Mileage Scales

MISSOURI'S Public Service Commission recently issued an order in Case 3421 establishing a mileage scale basis to apply on sand, gravel and crushed stone, for intrastate application between points in Missouri. A comparison of this scale with other intrastate mileage scales in surrounding states, on these commodities as well as the new interstate mileage scale fixed by the Interstate Commerce Commission in Docket No. 9702 for interstate application in this territory follows:

Miles	New Missouri Scale	Arkansas	Oklahoma	New Interstate Scale
10	\$0.60	\$0.60	\$0.60	\$0.60
20	.60	.60	.60	.60
30	.65	.70	.70	.70
40	.70	.70	.70	.70
50	.75	.70	.70	.80
60	.80	.80	.80	.80
70	.85	.80	.80	1.00
80	.90	.90	.90	1.00
90	.95	.90	.90	1.10
100	1.00	.90	.90	1.10
110	1.05	1.00	1.00	1.10
120	1.10	1.00	1.00	1.30
130	1.15	1.00	1.00	1.30
140	1.20	1.00	1.10	1.40
150	1.25	1.00	1.10	1.40
160	1.30	1.20	1.20	1.40
170	1.34	1.20	1.20	1.40
180	1.38	1.20	1.30	1.60
190	1.42	1.20	1.30	1.60
200	1.46	1.20	1.30	1.60
210	1.50	1.40	1.30	1.60
220	1.54	1.40	1.30	1.60
230	1.58	1.40	1.40	1.70
240	1.61	1.40	1.40	1.70
250	1.64	1.40	1.40	1.70

The new Missouri scale is higher generally than the scales in effect between points in Oklahoma and Arkansas on intrastate traffic. We have the Interstate Commerce Commission's word that the transportation conditions in western Louisiana, Arkansas and southern Missouri are the same as indicated in their report accompanying the new intrastate scale, given above. It is expressed in the following language: "It has been shown that the transportation conditions in Louisiana, Arkansas and southern Missouri are substantially the same."

They also state the new scale should apply between points in Oklahoma on interstate traffic. The different intrastate bases in a territory where the transportation conditions are similar are usually the result of individual handling by a local group of producers before the state commissions in which due regard is not often given to the level of rates in surrounding states or to the interstate basis.

Some producers are much interested in the interstate level of rates and complain about the lower intrastate level. The settlement of the whole question seems to be one in which all producers should take part, and all work together to the end that uniformity

will prevail on the lowest possible reasonable basis, whether state or interstate.

We have been unable to find where producers were represented at the hearing before the Interstate Commerce Commission as a result of which hearings the interstate scale referred to was promulgated. From indications, it received the approval of the Memphis producers and under guise of application from Memphis to Arkansas points it has now been made applicable from and to quite a large territory.

The objections to the new interstate scale is that it is too high as compared with the intrastate scales, and probably does not represent the lowest possible basis which might have been secured. It places in jeopardy the lower intrastate rates and sets a standard which it will be difficult to overcome.

The new Missouri scale established almost simultaneously with the new interstate scale of rates will also make it difficult for producers in Arkansas, Louisiana, and Oklahoma to maintain their lower intrastate rates.

In view of the tendency of the commissions to establish mileage scale on lower grade commodities it appears very important that even though the bulk of shipments may move on special commodity rates, producers are vitally interested as a whole in any mileage scale which is established on either state or interstate traffic to see that it reflects the proper level, because any scale, published or established, is always used to gage the level in other territories.

Reparation Recommended for Muncie Sand Co.

EXAMINER JOHN B. KEELER, Interstate Commerce Commission, has recommended that reparation be granted in a report on Docket No. 13644, Muncie Sand Co. vs. Director General, on a finding of unreasonableness in the rates on sand from Muncie, Kans., to destinations in Missouri and Kansas between July 19 and November 26, 1919. The complaint followed an adjustment made by the railroads in accordance with Kaw River Sand and Material Co. vs. A. T. & S. F.

Mr. Roth Resigns

ANNOUNCEMENT has been made that John C. Roth has resigned as director of service of the Interstate Commerce Commission, effective March 31, 1923, to become general superintendent of transportation of the Great Northern railroad, with offices at

St. Paul, Minn. Producers of road materials will lose a good friend by this change as Mr. Roth has always been courteous and considerate to those who have appeared before him for relief in car-service matters and he has always assisted in every way possible to adjust their car-shortage difficulties.

William P. Bartel, who has been special assistant to Mr. Aitchison in car-service matters, has been selected to succeed Mr. Roth.

Abandonment of C., P. & St. L.

THE Interstate Commerce Commission has authorized the receivers of the Chicago, Peoria & St. Louis Railroad Co. to abandon the line. The road will probably be offered for sale as a whole or in part. If not purchased it will probably be sold as scrap or junk. This is the largest railroad which has ever been known to have met such a fate.

Proposed Changes in Rates

Central Freight Association

6172. Molding Sand, Bremen, Clay Bank, Mexahala, New Lexington and Rushville, Ohio, to Flint, Mich., present, \$3.15 per net ton; proposed, \$2.52 per net ton.

6174. Sand and Gravel, Elliston, Ind., to Gudge, Sommerville, Mackey, Buckskin, Rosebud, Elberfeld, Elliott, Daylight, and Iglerhart, Ind., present 90 cents per net ton; proposed 85 cents per net ton.

6176. Sand and Gravel, James Siding (Belmar), Pa., to Detroit, Mich., present, 22½ cents; proposed \$2.40 per net ton.

6186. Minimum weight on Lime between points in C. F. A. territory and to destinations east of Westerntermini of Eastern trunk lines, present, as published in agency and individual lines' issues; proposed, 40,000 lb.

6204. Crushed Stone, Greencastle, Ind., to Cottage Grove, Ind., present 16½ cents; proposed, \$1.25 per net ton.

6213. Lime, common, hydrated, quick or slaked, minimum weight per Official Classification, points in Ohio to destinations in C. F. A. territory as described in C. F. A. T. B. Tariff 130N., present and proposed, as per Exhibit A:

From	Present	Proposed
Martin, O., to Lake City, Mich.	\$0.24	\$0.25
Marion, O., to Mineral, Ill.	.23½	.25
Sandusky, O., to Paducah, Ky.	.25	.28½
Marblehead, O., to Appleton, Wis.	.26½	.28½
Martin, O., to Fond du Lac, Wis.	.26½	.28½
Luckey, O., to Louisiana, Mo.	.26½	.28
Marblehead and Sandusky, O., to Kewaunee (local)	.20½	.24

6221. Lime, Petoskey, Mich., to Sault Ste. Marie, Mich., present, 12 cents; proposed, 10 cents.

6230. Sand and Gravel, Deeter, Ind., to Elkhart, Ind., present, 75 cents per net ton; proposed, 70 cents per net ton.

Illinois Freight Association

1736. Sand and Gravel, C. L., 70 cents per net ton from Steele, Ill., to local deliveries on the A. T. & S. F. in Chicago.

Southern Freight Association

9320. Sand and Gravel, C. L., from Spruce Pine, Ala., to Jasper, Ala. (applicable only on intrastate traffic), present rate, \$1.30 per net ton; proposed, 79 cents per net ton.

9332. Sand and Gravel, straight or mixed C. L., from Norris, Ga., to points in Georgia named below, present and proposed rates are:

	Present Per Ton	Proposed 2000 Lb.
Cordele	\$2.39	\$1.49
Moultrie	2.20	1.67
Quitman	1.94	1.67
Thomasville	1.94	1.71
Tifton	1.72	1.58
Valdosta	1.83	1.62

Proposed rates are in line with commodity rates from and to various points in the Southeast.
9346. Cement, C. L., from Ohio and Mississippi river crossings to Tennessee Central stations. The present rates on Cement from Ohio and Mississippi river crossings to stations, Waterworks to Lebanon, Tenn., are slightly higher than the lowest combinations, using Agent Jones' Combination Tariff. It is proposed to reduce these rates to the combination basis, using the Combination Tariff.

9363. Cement, C. L., from Kosmodale, Ky., to local stations on the N. C. & St. L. between Nashville and Hollow Rock Junction, Tenn., present rate, 19 cents per 100 lb.; proposed rate, 18 cents per 100 lb., same as currently applicable from St. Louis, Mo.

9376. Sand and Gravel, straight carloads, minimum weight, 90 per cent of capacity of car, from Paducah, Ky., and Memphis, Tenn., to B. & N. W. local stations. At present Class A rates apply. Proposed rates: From Paducah, Ky., 7 cents, from Memphis, Tenn., 8 cents per 100 lb. The proposed rates are the same as were in effect prior to April 1, 1922, except from Memphis, Tenn., to W. T. E. S., Patton and White Oak, Tenn., 8 cent rate is proposed instead of 8½ cent formerly in effect.

9349. Crushed Stone, C. L., from Viley to Lexington, Ky., present rate \$6.75 per car, plus 20 cents per net ton; proposed rate 35 cents per net ton made in cents per net ton with relation to the present rate in cents per car.

9443. Stone or Granite, Crushed, Flagging, Rubble or Stone Screenings, in bulk, in straight or mixed carloads, minimum weight, marked capacity of car, from Columbia, S. C., and points made with relation thereto, to North Carolina points named below. It is proposed to increase present rates as follows:

From Columbia, S. C. to	Present Per Ton	Proposed 2000 Lb.
Wilmington	\$1.13	\$1.35
Scotts Hill	1.13	1.49
Leland	1.13	1.35
Alabama Siding	1.13	1.35
Acme	1.13	1.35
Bolton	1.13	1.25
Whiteville	1.13	1.25
Chadbourne	1.13	1.25
Bolivia .....	.75	1.95
Southport	1.85	2.05
From Rockton (when from Rion), to Wilmington	1.24	1.76

9454. Cement, C. L., from producing points to Mississippi Central stations. It is proposed to revise present rates on the following basis: To local points between Natchez and Brookhaven, Miss., 5 cents per 100 lb. higher than present rates to Natchez; to stations between Brookhaven and Beaumont, 5 cents per 100 lb. higher than to Hattisburg, Miss. The proposed revision will have the effect of aligning these rates with those to stations on the G. & S. I.; present and proposed rates to representative points are in cents per 100 lb.:

From	To Leedsdale, Miss. Present Proposed	To Springfield, Ill. Present Proposed
Springfield, Ill.	\$0.27½	\$0.32
Chicago, Ill., Buffington, Ill., Dear Park, Ill. ....	.30	.34
Milwaukee, Wis. ....	.34½	.37½
Indianapolis, Ind. ....	.27½	.32
Peoria, Ill. ....	.27½	.32
Paducah, Ky. ....	.21½	.25½
Cape Girardeau, Mo. ....	.23	.25½
Cairo, Ill. ....	.21½	.25½
Cincinnati, Ohio ....	.26	.30
St. Louis, Mo. ....	.26	.27½
Birmingham, Ala. ....	.19	.24½
Leeds, Ala., Ragland, Ala. ....	.21½	.24
Richard City, Tenn. ....	.20½	.25½
Rockmart, Ga., Portland, Ga. ....	...	.25½
Spocari, Ala. ....	.19½	.21

From	To Silver Creek, Miss. Present Proposed	To Springfield, Ill. Present Proposed
Springfield, Ill.	\$0.31½	\$0.32
Chicago, Ill., Buffington, Ill., Dear Park, Ill. ....	.35	.34
Milwaukee, Wis. ....	.38½	.37½
Indianapolis, Ind. ....	.31½	.32
Peoria, Ill. ....	.31½	.32
Paducah, Ky. ....	.25	.25½
Cape Girardeau, Mo. ....	.25½	.25½
Cairo, Ill. ....	.25	.25½
Cincinnati, Ohio ....	.28½	.30
Birmingham, Ala. ....	.22	.22
Kingsport, Tenn. ....	.28½	.28½
Leeds, Ala., Ragland, Ala. ....	.22	.22
Richard City, Tenn. ....	.25	.25
Rockmart, Ga., Portland, Ga. ....	.23	.25
Spocari, Ala. ....	.20½	.20½

From	To Ferguson, Miss. Present Proposed
Springfield, Ill.	\$0.28 \$0.32
Chicago, Ill., Buffington, Ill., Dear Park, Ill. ....	.29½ .34
Milwaukee, Wis. ....	.33½ .37½
Indianapolis, Ind. ....	.28 .32
Peoria, Ill. ....	.28 .32
Cape Girardeau, Mo. ....	.21½ .25½
Paducah, Ky. ....	.21½ .25½
Cairo, Ill. ....	.21½ .25½
Cincinnati, Ohio ....	.26 .30
St. Louis, Mo. ....	.23½ .27½
Birmingham, Ala. ....	.20½ .22
Kingsport, Tenn. ....	... .28½
Leeds, Ala., Ragland, Ala. ....	.19½ .22
Richard City, Tenn. ....	.21½ .25
Rockmart, Ga., Portland, Ga. ....	... .25
Spocari, Ala. ....	.19 .20½

Southwestern Freight Bureau

7958. Lime. To establish rate of 30 cents per 100 lb. on Lime, carloads, minimum weight, 30,000 lb. from Ruddells, Ark., to New Iberia, La. Remarks: Shippers claim proposed change will restore the old differential of 2½ cents Ruddells over Texas producing points, which they state is proper basis to apply.

7074. Cement, etc. To establish rate of 31½ cents per 100 lb. on Cement, etc., as described in Item 2530, S. W. L. Trf. 15L. from Memphis, Tenn., to Muskogee, Okla. Remarks: Proposed change is desired to place all lines on parity on the traffic in question.

8012. Gravel. To establish rate 6½ cents per 100 lb. on Gravel carloads, minimum weight marked capacity of car, from Fullerton, La., to Kountze and Voth, Texas, and intermediate points. Remarks: Class E route is now in effect, which, it is claimed, is too high to move the traffic. The rate proposed is in line with rates on the same between points for the same or greater distance.

New England Freight Association

4417. To revise the present commodity rates as published in Item Nos. 575, 577, 579, and 581 of B. & M., I. C. C. A2452, applying on Molding Sand, minimum weight, 90 per cent of the marked capacity of car, except when car is loaded to cubical or visible capacity actual weight will apply, from B. & M. sand shipping stations located in the Mechanicville district to points located on the N. Y. C. to the proper basis, which is 1 cent per 100 lb. over the N. Y. C. local rates from Schenectady, N. Y., as published in N. Y. C., I. C. C. 13911. Reason: To restore relationships.

4432. To add Stone, Grout or Rubble, minimum weight marked capacity of car except when cars are loaded to cubical or visible capacity, actual weight will apply, to Maine Central mileage commodity tariff, I. C. C. C3853, applicable locally on the Maine Central on same basis of rates as in effect on Crushed Stone.

Trunk Line Association

11243. Sand, C. L., minimum weight marked capacity of car, etc., from Ogdensburg, N. Y., to Norfolk and Raymondville, N. Y., 5½ cents per 100 lb. and to DeKalb Junction and Rensselaer Falls, N. Y., 6 cents per 100 lb.

11251. Lime, C. L., minimum weight 40,000 lb., from points on the P. & R., Annville, Brownstone, Swedeland, Pa., and other points, to stations on the N. Y. N. E. & H. R., B. & M., also M. C. stations taking Brunswick and Sherbrook rates, 19½ to 25 cents per 100 lb.

Western Trunk Line Docket

3035. Stone, broken, crushed or ground, C. L., from Diorite, Ishpeming, Marquette and Pinchill, Mich., to Ottawa, Ill., present, 18 cents per 100 lb.; proposed, 15½ cents per 100 lb. Minimum weight 90 per cent of marked capacity of car, but not less than 40,000 lb.; when loaded in hopper bottom ore cars, 75,000 lb.

3036 (Corrected). Cement, Natural, Hydraulic or Portland, C. L., from Cumberland, Security, Hancock, State Line, Union Bridge, Md., and York, Pa., to Mankato, Minn., rates in cents per 100 lb.; present, all rail, 44½ cents; rail, lake and rail, 41 cents; proposed, all rail, 38½ cents; rail, lake and rail, 34½ cents. Minimum weight, 50,000 lb.

3045. Cement, Hydraulic, Portland or Natural, C. L., from Hannibal, Mo., to points shown.

RATES IN CENTS PER 100 LB.

To	Present	Proposed
Ft. Calhoun	\$18.5	\$17.5
Blair	18.5	17.5
Herman	19	17.5
Tekamah	19	17.5
Craig	20	17.5
Oakland	20	17.5
Lyons	20	17.5
Bancroft	20.5	17.5
Pender	20.5	17.5
Thurston	20.5	17.5
Emerson	20.5	17.5
Nacora	20.5	17.5
Hubbard	20.5	17.5
Coburn	21	17.5
Dakota City	21	17.5
So. Sioux City	21	17.5

To be subject to B. T. Jones' Freight Tariff 228, I. C. C. U. S. 1, minimum weight, 50,000 lb., as shown in Consolidated Classification No. 3.

3045A. Cement, Hydraulic, Portland or Natural, C. L., from Hannibal, Mo., to a few points representative of the situation involved herein:

RATES IN CENTS PER 100 LB.

To C. R. I. & P.	Present	Proposed
Lincoln, Neb.	\$19	\$16
Richfield, Neb.	18.5	16
To Mo. Pac. ....	...	...
Walton, Neb.	18.5	16
Murray, Neb.	17.5	16
Nebraska City, Neb.	15.5	15.5
Padonia, Neb.	16.5	16

To be subject to B. T. Jones' Freight Tariff 228, I. C. C. U. S. 1, minimum weight 50,000 lb., as shown in Consolidated Classification No. 3.

British Pioneers in Concrete and Gypsum Tile Industries

"THE King of Granolithic" is dead, states the *Illustrated Carpenter and Builder*, an English publication devoted to the building industry. He was Peter Stuart. The other pioneer was W. B. Wilkinson. Both men were plasterers, keen, shrewd, and "hard nuts to crack."

Mr. Stuart was born in Aberdeenshire in 1836. In the old days he was always "on the alert to attract attention, and devoted much time to street preaching, dressed in a tall white hat and frock coat." In his patent, granted in 1881, he refers to concrete as "granolithic." He even entered suit against all who attempted to use the word, but the court said that "the manufacturer of a concrete formed by a mixture of crushed granite and portland cement laid on a foundation of various kinds was a matter free to all the world." Mr. Stuart died in his 86th year.

Mr. Wilkinson, after serving his time as a plasterer, quickly made headway, and began manufacturing artificial stone and concrete. Some of his work, put up nearly 70 years ago, still stands as a monument to his industry. He, also, took out patents for "the invention of improvement in the construction of fireproof dwellings, warehouses, and other buildings or parts of the same."

He was the first Englishman to conceive the idea of reinforcement in concrete. These "concrete floors were to be reinforced with wire rope and small iron bars imbedded below the central axis of the concrete." His historian believes that Mr. Wilkinson held the first invention for plaster partitions, the specifications being filed in 1855.

The first "in situ" concrete flooring was laid in a greenhouse in 1853. It was the birth of "Insitu" concrete paving. The aggregate at first consisted of hand-broken "scars" or "scoria," the names given for fused gas retort firebrick and hard clinkers, and this class of material is still used in Newcastle-on-Tyne, but is specially crushed and prepared.

It was in 1877, while engaged in paving work in Edinboro, that Mr. Wilkinson first met Mr. Stuart. The latter used to watch Wilkinson's men at work, and was no doubt inspired to study improvements in the concrete paving industry.

Hints and Helps for Superintendents

Crushed Stone Service Bins

NO ONE needs to emphasize the value of service to the business man. It's pretty hard to sell anything without service.

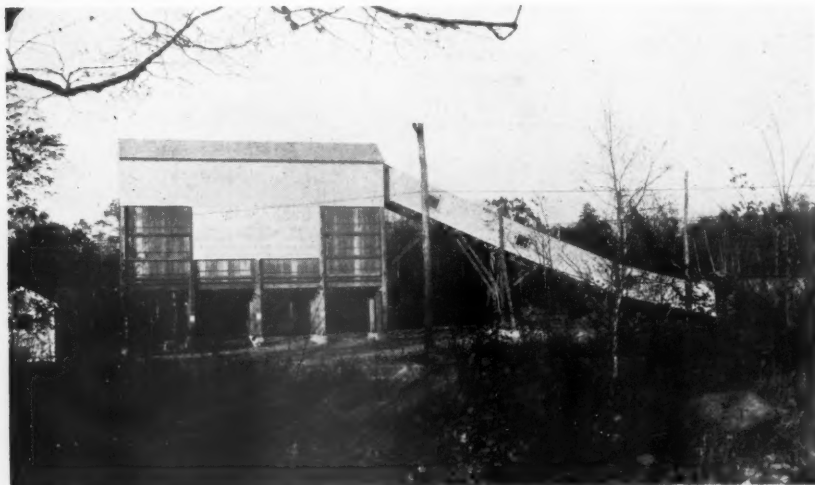
One of the advantages—perhaps the chief

ience of the trolley company. The service bins are on the eastern outskirts of the city, nearest the quarry.

The bins are provided with an unloading hopper as shown. A belt conveyor takes the stone to the tops of the bins, where a tripper places whatever size stone is

come for their material as they would for lumber or coal or any other regularly recognized commercial commodity.

These are real service bins. They serve the contractors and builders of Waterbury, and they serve the Connecticut Quarries Co. as a safety valve at the producing plant. When the plant bins are full and orders for a certain size are slack, the stone can still be moved and eventually sold at a price that pays for the movement and the overhead. And no one knows how many orders this kind of publicity and exhibit of progressive merchandizing bring the producer.



Service bins of the Connecticut Quarries Co., at Waterbury, Conn.

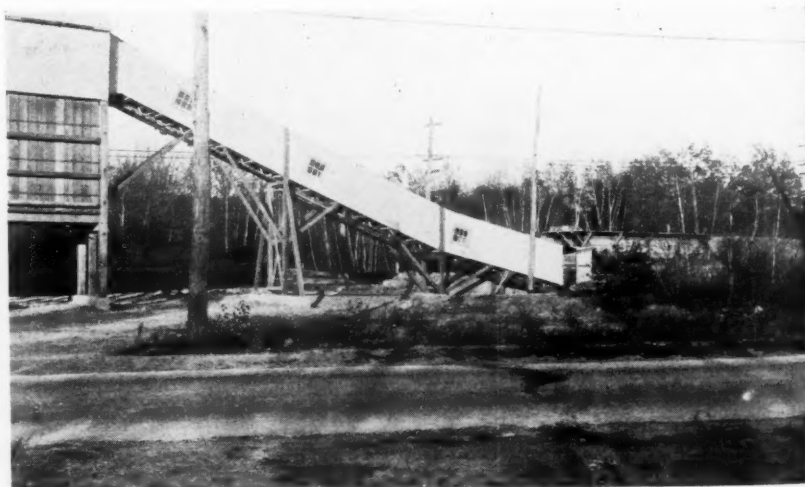
advantage—of a storage pile for a crushed-stone or gravel plant is the ability to serve material when your customer wants it, in season and out.

The Connecticut Quarries Co., with headquarters at New Haven, Conn., and quarries at various points in Connecticut, has taken a much further step in service to customers a step, we believe, that will point the way to better business and better prices to all mineral aggregate producers. The day has gone by when contractors can depend on back-yard pits and roadside quarries.

The views herewith show the new service bins of the Connecticut Quarries Co. at Waterbury, Conn. The nearest quarry to Waterbury is at Mt. Carmel, a distance of about 15 miles. Waterbury, nevertheless, is a good customer of the Connecticut Quarries Co. Stone is transported there from the Mt. Carmel plant by truck and by trolley line. The trolley company is anxious for this freight business and has long had special cars for carrying crushed stone.

Day-time deliveries by trolley interfere more or less with the regular trolley half-hourly service between Waterbury and New Haven—most of it over single-track line. So it was easy to get a special rate from the trolley company for transporting stone from the plant to the Waterbury service bins, it being done largely at the conven-

being handled at the time in the proper bin. All the regular commercial sizes are carried in stock. A sales office and wagon



Dumping hopper and belt-conveyor gallery of service bins

scales complete the equipment. Two men can run the plant.

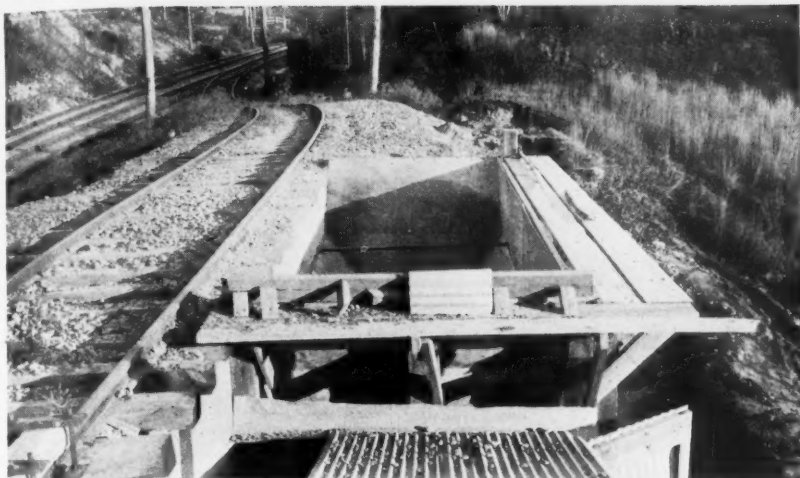
The bins are trim and substantially built. A large sign on the side in blue and white tells what they are. Dealers and contractors

lubricant such as may be made from 10 parts beef tallow, 2 parts heavy oil, and 1 part powdered graphite; or lubricant prepared for this purpose can be readily procured.

How to Take Care of Drive Chains

WE are often asked: "Should chains be oiled?" says the *Ironton Magazine*. They should. But the use of a stick of graphite, or pouring of oil on the exterior surface in place of on the sprockets is not lubricating the wearing parts. The inner joint of the chain, between the pin and its bushing, is where the friction and wear occurs.

For best results, two sets of chains should be used alternately. This permits the set just removed to be carefully inspected, cleaned by the application of kerosene, gasoline or turpentine, and allowed to drain. When clean and dry, soak the chains in some melted



Concrete and steel receiving hopper of Waterbury service bins

Sprockets should be frequently inspected to make sure of the alignment. Sprockets worn to a hooked form of teeth should either be turned or replaced; in this condition they exert a wedging action as the chain enters and leaves it, which cannot be resisted by any chain, and the result is that a new chain will be quickly ruined. Locomotive chains should be just a trifle slack, never taut.

When inspecting, look for broken or cracked rollers, inner side plates worn badly, links showing undue looseness indicating broken bushings or excessive pin wear, and pins loose in pin plates. Repair all defective parts immediately. Do not run chains with rollers missing.

The removal of the entire roller link is recommended whenever a broken roller is discovered. Do not attempt to take the roller link apart and merely put on a new roller. The roller links are assembled with great care and have just the correct amount of press fit between bushings and inside plates, and cannot be readily repaired without destroying this condition.

Systematic inspection, proper lubrication, and prompt repairs will eliminate delays from breakdown in service, and reduce chain maintenance to a negligible cost.

Screens Protect Oil House

SOME few months ago it was necessary for the Weston & Brooker Co., Columbia, S. C., to build a new oil house because its old one had been badly damaged by stones hurled by blasting. Since it was necessary that the building be within the range of the blasting, it was imperative that some means of protection be devised for the new building other than to construct it of sheet steel or iron.

In devising a means, the company accomplished two things in addition to providing a protection to the house: It used up a scrap pile of several worn-out sections of

perforated screens and also provided a shelter for the men who might be in that vicinity at the time of a blast.

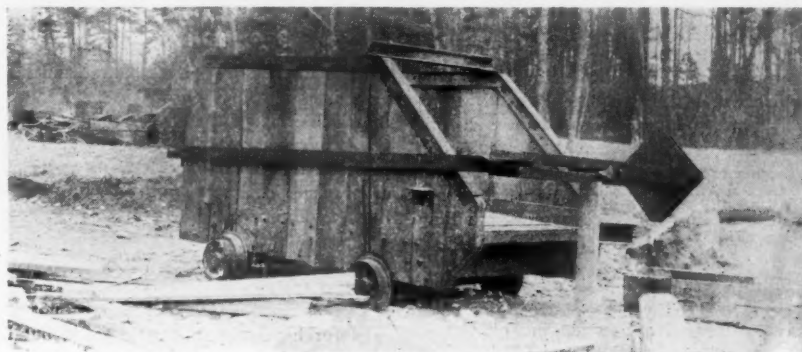
As may be seen in the illustration, four



These screens, set up in billboard fashion, protect the oil house from stones hurled by dynamiting

upright posts were set up approximately 4 ft. from the building on the side facing the quarry and the flattened sections were

lete. A bar of 1x4-in. iron is to be bolted on either side at the front end to guide the bale as it works up and down.



This skip car, with block on the bale, is expected to prove more satisfactory than those not similarly equipped

nailed to them, thus forming a shield and at a minimum of cost.

Block on Skip Car Bale

A RATHER unusual feature of a skip car, recently designed and built by Robert Lacy, of the Neverson Granite Co., Simms, N. C., is that the bale is provided with a large single block instead of the usual provision of merely fastening and clamping a one-part line to it. In this way a two-part line makes possible a more uniform pull and response to the application of power.

The car, which was made in the company's own shops, is of five-ton capacity and is 9 ft. long by 4 ft. wide, by 3½ ft. deep, inside measurement. It is constructed of 2-in. oak, lined on the sides and end with 1-in. oak and on the bottom with a ¼-in. steel plate. All corners and edges are covered with 4x4x¼-in. angle iron, the sides being held together by a piece of 30 lb. steel rail and the bale, which extends the full length of the car, is made of 1x4-in. iron bars. The car as illustrated is incom-

Questions and Answers

Edmund Shaw, Consulting Engineer, Chicago, Ill., Expert on Problems of Screening, Washing and Hydraulic Separation

THE TECHNICAL STAFF OF ROCK PRODUCTS

Edwin Brooker, Washington, D. C., Consulting Expert on Matters of Transportation and Freight Rates

Gordon Smith, First National Bank Bldg., Chicago, Ill., Expert on Crushing and Cement-Plant Problems

No. 42. Splitter Gates—In your issue of January 27, in the article on "The Design of Sand Plants," you speak of "splitter gates" for dividing the flow in a trough. Where are these gates made?—J. M.

A.—So far as the writer knows, these gates are not sold by any manufacturer but are always made "on the job." The construction is very simple. The splitter is worked out from a piece of hard wood and fastened to the side of the trough by a piece of old belting which serves as a hinge. A cross piece nailed on the top of the sides of the trough and a wedge driven between the splitter and the cross piece holds the splitter in the required position. This divides the feed evenly, unless the current in the trough has a side-to-side movement, as sometimes happens. In such a case the trough has to be set so that the current will be even all across the bottom of the trough. The side movement of the current comes from too high a velocity.—E. S.

No. 43. Carrying Sand in an Inverted Siphon—I wish to convey sand across a river by adding water and running it through an inverted siphon. The total distance is about 3000 ft. There is a fall of 350 ft. to the river, then a flat stretch for 1500 ft. and then a rise of 150 ft. Is it practical to do this?—B. R.

A.—The writer has used inverted siphons for carrying sand and water across a ravine, but never so long as that which would be needed for this case. Such a pipe line presents a real engineering problem, and the decision to use it should only be made after the details had been worked out. Rough calculations show that such a siphon would have sufficient velocity to carry sand; provided that the mixture of sand and water was sufficiently diluted, and also that the sand did not contain too large a percentage of coarse grain. Where there is abundant water available at the head of the pipe, this is a good way to transport sand. The writer recalls a pipe which was installed to handle sand in this way about 15 years ago. It was longer than the pipe which would be required in the present case, but it was not an inverted siphon. The grade was only 4 per cent, but it worked very well, handling 20-mesh material and finer.—E. S.

No. 44. Wire Rope Transmission—A pump 1600 ft. from the sand plant is at present driven by a gasoline engine. We have to install a new engine or put in some other kind of power. I am told that power has been successfully transmitted for such a distance by wire ropes and pulleys. Would this be a good method to

use in our case? We have a steam engine at the plant which has sufficient power to drive the pump in addition to the plant.—M. C.

A.—The writer has seen long wire-rope transmissions in use, but not in recent years. Marks' "Mechanical Engineers' Handbook" speaks of transmissions as long as 1700 ft. in a single span, so the method could be used if it was desirable. But such transmissions are less efficient and more expensive to install than electrical transmission. A representative of one of the largest manufacturers of wire rope was asked about this and he said that he knew of no installations of long wire-rope transmissions being made nowadays.—E. S.

No. 45. What Mica Is—I know of a deposit of mica, but do not know what it is used for, nor how it can be marketed.—T. A. H.

A. Blocks of mica as they come from the mine, with the adhering rock removed, are known as mine-run mica. These blocks are sometimes called "books." Mine-run block or book mica, is often sold as such without further preparation by miners in the West and in New Hampshire, but rarely by miners in the South. Uncut mica is mica that has gone through the first stages of preparation for use. The uncut is usually classified to the extent of the trimming. "Thumb-trimmed" mica has had the imperfect parts and foreign material removed by the finers; "knife-trimmed" has had the imperfect parts removed with a knife. Mica imported from India is often called "sickle-trimmed" mica; it is more closely trimmed than domestic knife-trimmed and rarely contains cracks or flaws; it approaches a rounded rectangle in shape and the edges are beveled. "Shear-trimmed" Madras mica is cut into roughly square patterns and the edges are cut perpendicularly to the flat surfaces of the sheet instead of being beveled. Sheet mica is sometimes classified according to the uses to which it is put. Condenser and phonograph micas are of the highest quality and must be free from imperfections and split evenly and cleanly. It is necessary to obtain films as thin as 1/1000 in. for use in condensers, as each film must resist high voltages. "Stove mica" is essentially clear, with but few spots or stains. "Electric mica" is slightly stained or spotted and cannot be used for high-voltage electric work, but is good enough in general electric insulation. "Splittings" are thin films split from the smaller sheet mica and used in making built-

up mica board. They are not necessarily of first quality and are irregular in shape and outline. The splittings are re-assembled to form a large plate of uniform thickness, and shellac or other binder is spread evenly over the splittings. Heat and high pressure mold these splittings into a finished mica board. Special trade names—Micanite, Micabeston, Micabond—are given to the built-up mica boards manufactured. Scrap mica is the waste that results from the trimming and cutting of sheets as well as the mica from the mines having no value as sheet. This mica is separated from the waste rock and ground to different sizes according to the use to which it is to be put. The above data is from a report of the U. S. Bureau of Mines from which fuller details may be obtained.—N. C. R.

No. 46. Average Royalty of Sand—What is the average royalty paid to owners in the mining and selling of sand? What is the best method of determining the monthly amount due each party?—G. C.

A. We cannot do better than refer you to the article by C. C. Griggs, "Your Income Tax," in the February 10 issue of ROCK PRODUCTS, on page 31, wherein 3 cents is mentioned as a fair royalty. To some extent, the royalty would be determined by the value of the property after the sand and gravel has been removed. There are instances where material occurs in banks where the property is of as much or more value after removal of the sand and gravel as before, even in a pit proposition where the material is removed to a depth of from 40 to 50 ft. When the hole fills with water the pond is sometimes of greater value for harvesting ice or as a bathing pond than the original property. In the Central West, where bathing ponds are rare, there are instances in which the old pits have been converted into community bathing ponds and charges made for the bathing privileges.

The best method of determining the amount due monthly is to have access to the production records of the plant, if the royalty is on the production basis. If it is based on the amount shipped, the records are readily available from either the producer or the railway. The owner of the property may have a survey made at any time by a reputable civil engineer, who, by making a cross-sectional survey of the land, can determine within reasonable limits the amount of material removed.—N. C. R.

New Device for Measuring Consistency and Plasticity of Plastic Materials

MANY recognized authorities interested in the properties of cement, lime and gypsum have agreed that the setting time, strength, density, and workability of each of these materials are governed to a greater or less degree upon the consistency or wetness of the samples prepared. This property of consistency is more commercially accepted as being a vital factor in the mixing of concrete, and in the manufacture of gypsum plaster boards and gypsum building blocks and tile.

Devices have been developed in the past to measure consistency of cement and gypsum, but no device has been adopted as a standard method among laboratories or in the field for the apparent reason that no single device has met the need of giving positively accurate results and at the same time being practical to use.

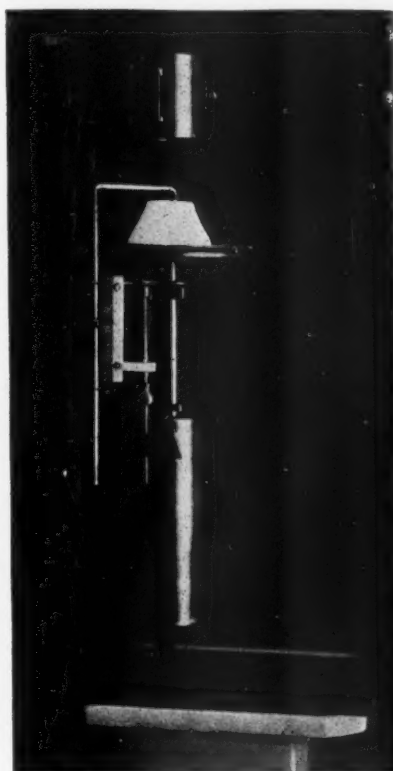
To satisfy this need in the laboratories of one of the large gypsum companies, a device has been developed by the writer that proves very satisfactory and has been accepted among gypsum manufacturers as a more positive as well as practical device than the commonly known "slump test" or the "flow table," which have been used in measuring the consistency of cement from time to time.

The main principle involved is the reverse of the "slump test"—that is, the sample is lowered vertically from the container at a uniformly retarded rate. The rate of flow of the sample from the container is automatically regulated to any desired or necessary degree by a dashpot cylinder containing water. Thus it is apparent that the human element is eliminated as affecting the rate of flow, which is not always constant in the "slump test."

Exhaustive experiments have shown that, to obtain the best results in measuring consistency of cement, gypsum, lime or clays, that the rate of flow should be retarded as slow as possible for the reason that the sample then has time to more completely disengage from the wall of the container and will be deposited in a more symmetrical form upon the glass plates resting upon the table.

Working on this theory, it has been found that when the table is lowered at a much faster rate, thus increasing the rate of flow, that a measurement of the excess adhesion left in the container is a criterion of the plasticity, as is shown in the chart, which reveals comparative water absorbing qualities and other data observed during tests made with various commercial brands of plastic materials.

The construction of the device provides, that when testing sanded gypsum plasters



This device measures the consistency and the plasticity of plastic materials

or concrete, that after the sample has been deposited upon the table at a necessarily slow rate, the sample is automatically given a definite agitation or jarring which spreads the mass to a correspondingly larger extent, so that the comparative qualities can more clearly be measured of such substances of so dense composition that they will not readily flow.

The features of the device—which provide for various sizes of molds or containers to be used, for the immediate changing of these containers for cleaning, for the removal of the glass plates upon which the samples are deposited and can be saved for any future examination—tend to make the device very practical to use for routine as well as research work.

Metric scales are attached to the device in such manner that the diameter readings of the base and measurements of the height of the samples, which are usually formed in the shape of frustrated cones, can be observed at any level at which the table is stopped.

Experiments made with the device have proven very interesting as well as instructive, and its unvarying accuracy has helped to demonstrate properties of gypsum, although undoubtedly not unknown, were not previously so seriously considered.

As an example: Several theories have been advanced as to the reasons why the addition of accelerators will weaken the strength of gypsum while retarders will apparently strengthen gypsum. This device shows clearly, however, that accelerators will increase the affinity of gypsum for water while a retarded gypsum requires less water to obtain a standard consistency. These opposite effects alone will naturally promote the formation of a more porous weaker cast when an accelerator is added, and a denser, stronger cast when the gypsum is retarded, regardless of what other minute effects may result from their addition in either case.

It has been found that the loss in height of the samples is the most reliable criterion for determining the amount of water used or a standard test of consistency.

The time required for the sample to completely flow from the container is in direct ratio to the height of the samples formed, but little work has been done thus far to determine other advantages, if any, that may be gained by observing this factor.

	Percentage of water of total mixture	Time of flow Sec.	CHART		Dimensions of sample before agitation		Dimensions of sample after agitation		Adhesion to container Grams
			Hght. cm.	Diam. cm.	Hght. cm.	Diam. cm.	Hght. cm.	Diam. cm.	
Cement	26.0	11	2.3	10.0	2.2	10.0	5.8		
Gypsum	37.5	12	2.4	9.9	2.0	10.4	6.0		
Lime	48.0	12	2.3	10.1	2.0	10.6	6.0		
Plastic clay	58.0	13.5	2.5	9.7	2.3	9.8	8.0		
Cement	26.0	4			2.2	9.7	5.7		
Gypsum	37.5	4			1.8	10.2	8.0		
Lime	48.0	4			1.8	10.4	9.8		
Plastic clay	58.0	4			2.0	9.6	10.4		

It is noted that the cement and plastic clay are less affected by agitation or jarring, perhaps because of the greater density of the cement and the greater plasticity of the clay.

Quarried from Life

By Liman Sandrock

The Man Who Hands a Jolt to the Quarry Man

MOST of us love the fellow who punches straight out from the shoulder; who won't hit in the clinches or below the belt; who comes back for more when he hits the canvas on the count of four. He's a regular he-man, than whom there is none whomer!

With this figurative preliminary, we are asking: Have you already read R. M. Van Winkle's "Jolt for the Quarry Man!" elsewhere in this issue before reaching this "quarry?" Editor Rockwood says it's hot stuff, but it comes from a man with experience.

And right here is our cue, Experience, to further introduce you to Mr. Van Winkle; who he is, what he is. Let's dig down in the Quarryman's Whoswho and shake out a few facts. As Dickens' Tom Gradgrind said: "We want nothing but facts, sir; nothing but facts."

First off, R. M. Van Winkle was born in Indianapolis in 1887—and he's far too young for us to perpetrate one of those "Rip" wheezes. His dad, J. Q. Van Winkle, now retired, was formerly the general manager of the Three C's and Saint L. railroad. President Gorman of the Rock Island System says: "I'm a railroad man because my father was one before me." And perhaps it was so in young Van Winkle's case, for we find that R. M. started in in 1903 on the Big Four as a rodman on relocation work. The next year he is taking a special course in civil engineering at Purdue, and the next, he's back again as transitman and assistant engineer with a field survey party on his dad's lines.

From 1906 to 1909, we find him in charge of concrete and steel construction work for the H. Eilenberger Co., Chicago, and later in charge of a branch office.

By 1916, Van had designed, erected, operated and managed the Inland Slag Co plant at Buffalo, N. Y.; built and operated the Ohio and Indiana Stone Co. plant at Greencastle, Ind., and that of the France Stone Co. at Toledo.

Experience? My dears, you don't know the half of it! Listen!

He was assistant general superintendent for large Eastern contractors in 1917; had charge of quarry and efficiency work for a company owning and operating 20 large limestone quarries, and by the time Pappy Time had brought to fruition 1921, Van had been assistant general manager in charge of three quarries and modern lime kilns and a hydrating plant for the National Lime and

Stone Co., Chicago, and had done private consulting work for lime plants and quarries in California and Oklahoma.

Today, Mr. Van Winkle is general manager and part owner of the Hawkeye Quarries Co., Cedar Rapids, Iowa, in charge of sales and operation.



R. M. Van Winkle

This is just about crowding the well-known Experience back off the boards, eh?

Of course, he's a member of the A. S. C. E. He was also a prime mover in the organization of the Indiana stone men in 1913 and its secretary for three years, until they got a paid secretary. And now he has organized the Iowa Stone Products Association, after others had failed in their attempts, and is its executive secretary. Again, he was one of the first to advocate the use of engineering in quarry operations as well as having an engineer give locations and elevations in drilling operations.

And his industrial beliefs? Well, we can sum up his creed in about this fashion, giving enough articles to establish a creed that should satisfy the most fastidious:

He's a believer in organization and has a following in real quarrymen because he believes in treating them square, housing them well, feeding them good, and keeping them interested in their work. "Feed a man and you can work him," says Van.

He's an advocate of the bonus system in quarries and lime plants and has been successful in using the system. "It gives you a better class of men and keeps them interested," says he. "Educate your men in the business. Don't promote a man unless he in turn has educated a man to fill the job he is leaving. Tell your men that if they can't find something to do to keep themselves busy, it is evident that you have too many men on the payroll and therefore he is not needed."

He believes in using engineering principles in quarry operations—"the quarry business is a profession."

He believes that there is a fertile field in the quarry business for consulting operating engineers.

Now you have it! Isn't it "hot stuff?" Just watch his smoke, for we believe that R. M. will make a big dent in the industry before he is many years older. Don't you?

Telling the Secretary Where He Gets Off

THE trials and tribulations of the association secretary are manifold. He cannot afford to make threats to delinquent members. Read what this one wrote:

Deer Seccyterry—I got your leter about what I owe you. Now be pachunt. I aint forget you. Plese wate. When sum fools pay me I pay you. If this wuz judgment day and you wuz no more prepared to meet your Maker as I am to meet your account you sure would have to go to hell! Trusting you will do this, I am

A. STONE.

They Said It

OUR BELIEF in the marble tombstone is dead! The Bureau of Standards says that "after 100 years the thin marble tombstone sags several inches and bends over"—no longer holds up its head as a head-stone.

C. O. DOWDELL achieves a reputation! The *Great Bend Tribune* says:

"C. O. Dowdell of the National Lime Association is in town today. One of the uses which is causing a greater production of lime all the time is the use of it in cement as a waterproofing composition and that is one of the things Mr. Dowdell emphasizes. He is the owner of a farm in Dakota and another in Indiana and the farmer officers around the courthouse say he knows farming conditions and knows them right."

BROTHER PERROW of the Lehigh Portland Cement Co., out to Spokane, heads a bureau furthering the friendly, co-operative spirit among salesmen in that wondrous country. Talk about cementing friendship, there's nothing that will cement it cementer than cement, is there?

AND SPEAKING OF CURRENT TOPICS, they have a Commoners' Club in Spokane—young men who meet at the Crescent to discuss current topics—and its vice-president is Paul Hahn, of Brother Perrow's company. 'Tis cement "has a way wid it," as Private Mulvaney was wont to say.

Editorial Comment

All who have read Vitruvius' books on architecture must realize that the ancient Romans knew how to make better lime plaster than we do now. Whether the Romans got their knowledge from the more ancient Greeks and they from the contemporaries of King "Tut," in Egypt, is an open question. But if we can make lime plaster economically under present-day conditions as good as the Romans made it when time and labor were not much considered, we have taken a big step forward in our use of lime.

A Pittsburgh inventor claims he has found the method; and John C. Schaffer, of the Schaffer Engineering and Equipment Co., is too well known for his work in the lime industry already to need an introduction here. At least one "old war horse" of the lime industry, "Jim" McNamara, has enough faith in the discovery to invest his money in it.

There are many other seekers after light in this direction and we shall await their findings with interest. But we must all be on our guard against letting the business of making lime-plaster hardeners fall into the patent medicine class.

The directors of the American Railway Association, meeting in New York City on April 3, are reported to have adopted a definite program to defeat the plans of the political radicals in Congress who aim at repealing the Esch-Cummins law, and eventually forcing government ownership on the railways. The railway executives propose to defeat these radical plans by the very logical method of giving better service and trying their best to satisfy their customers—their natural allies—the shippers. And among those shippers let rock products producers not forget they are no inconsiderable factor both in tonnage furnished and revenue produced.

The measures the railway executives propose, it is understood, include definite plans for expansion of facilities and improvement of credit which will enable the railways to give highly efficient service. Now, expansion of facilities means construction, and construction means business for rock products operators, from cement to sand and gravel. Moreover, bitter experience the last few years has taught shippers that efficient railway service is a bigger factor in the successful operation of their plants than freight rates.

There is no real cause for antagonism between the railways and their shippers if the railway officials are sincere in their protestations of a desire to give the very

best possible service in return for revenue received. The present position of the railways is indeed such that they must have the sympathy and assistance of the shippers if government ownership is to be deferred. Therefore if the shippers—you rock products producers—fully realize the trump cards that they now hold, they will have no difficulty in getting service and co-operation from the railways, if they go about it right.

To assist shippers in getting better service and avoiding car shortages the railways have already decentralized the car service department of the American Railway Association and have established district offices at various transportation centers such as Toledo, Cincinnati, Birmingham, etc.—nine districts in all—as described on page 25 of *ROCK PRODUCTS*, March 24, 1923.

It is no longer necessary or desirable to run to Washington with every business ill or complaint. There is no denying that it was necessary a short time ago, and may be necessary again. But just now the railway executives profess to be anxious to serve and to please shippers. Most of us feel that it is high time for them to take this attitude. And it is only fair—and good business to boot—to take them at their word; and, incidentally, help take one big business and many lesser ones out of politics.

For those trade associations whose principal objective is the handling of traffic matters, it is obvious that strong district organizations are again in line with the attainment of best results. The mineral aggregate producers—crushed stone, sand, gravel and slag—of the South, realizing this changed condition, have recently organized a straight out-and-out independent, district, traffic association (*ROCK PRODUCTS*, February 24, page 27).

The avowed objects of this association are to study intensively local conditions and frankly discuss them with railway officials, and to bring about adjustments satisfactory to both producers and railways. Certainly this is a businesslike course to pursue; and if both parties are sincere, reasonable and not too impatient, there is every likelihood that the old intimate relations between aggregate producers (and incidentally ballast producers) and the railways will be restored.

Such movements, however, in no way weaken the national associations of these industries if the activities of the national associations have been wide enough to include many other legitimate enterprises, such as promotional work, assistance in standardizing specifications, co-operation with government engineering and scientific bureaus, but most important of all, educational work among their own members to make them better and more efficient operators.

New Machinery and Equipment

Hoist and Derrick Installation for Storage

"WHEN market conditions are slow and cars are hard to obtain, most sand and gravel producers are confronted with a storage problem," states the Clyde Iron Works Sales Co., Duluth, Minn.

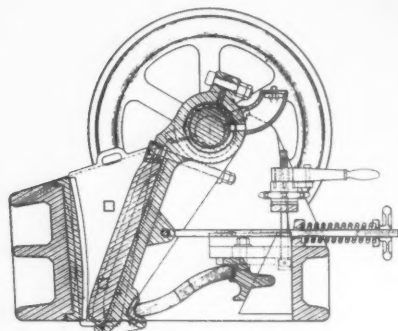
"The installation of a hoist and derrick greatly relieves this situation, because with this machine materials may be stored in stock piles, then when the rush comes, cars may be loaded from these stock piles, thereby saving the loss of customers and, what is more distressing, the loss of profits."

This company manufactures derricks and hoists, with either steam, electric or gasoline power for clamshell bucket operation, as well as steam, electric, gasoline or belt-driven hoists suitable for spotting cars at the loading plants.

New Line of Jaw Crushers

THE Iowa Mfg. Co., Cedar Rapids, Iowa, is manufacturing a jaw crusher, known as the Cedar Rapids, which is recommended for crushing limestone, trap rock, boulders, gravel, shells or any refractory material. It can be adjusted to crush anywhere from $\frac{1}{2}$ to 3 in. without stopping the machine or even checking the flow of material into the crusher. The machine is made in jaw opening sizes of 9x12 in. up to 14x36 in.

The base of the crusher is designed and ribbed in line with the greatest strain so as to distribute shocks equally through the entire base. This is done by joining horizontal and vertical ribs and by setting the bearings in the base.



The jaw crusher in detail

The side bearings are phosphor bronze half shells, which are interchangeable. Large steel oil rings deliver the lubricant to the top of the shaft. The pitman bearing is a

one-piece phosphor-bronze bushing. Oil is injected by gravity through three openings into a large oil groove, at what is called the free point in the bearing, or that point which does not come in working contact with the shaft.

The pitman head is split at the top instead of at right angles with the working face, which, it is claimed, eliminates excessive strain on the tie-bolts.

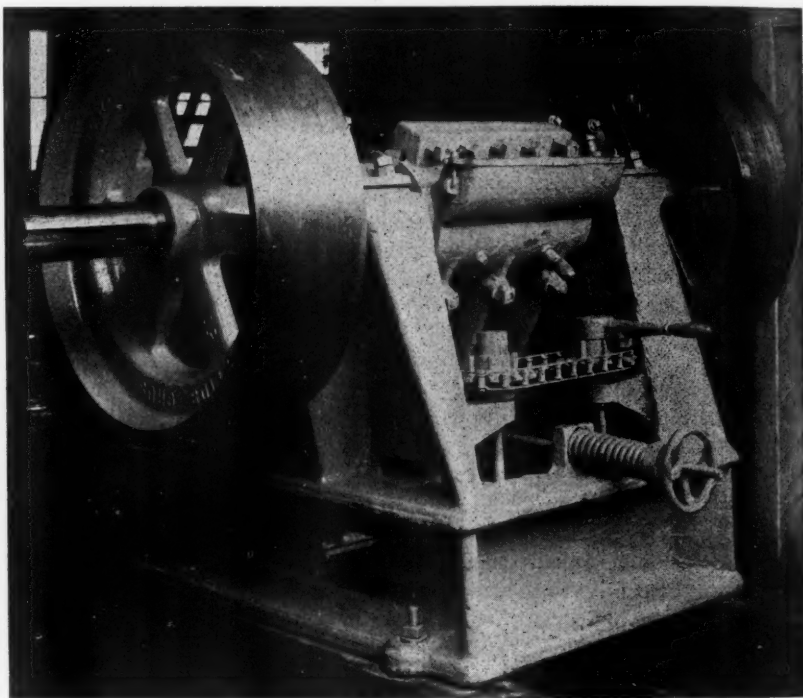
Both jaws are of manganese steel and are reversible. It is said to grip readily any stone which will go in the opening of the machine, and not pinching and throwing it

complete line of elevators, screen and conveyors.

Centrifugal Separator for Sizing Materials

THE Rubert M. Gay Co., New York City, which formerly built the Gayco Emerick, has dropped the name "Emerick," which led many to confuse it with the old Emerick separator.

The "Gayco" is a centrifugal, not an air separator. While it is called an air separator to distinguish it from screen separa-



Jaw crusher adjustable to from $\frac{1}{2}$ to 3-in. sizes

up, or what is called by crusher men a "pea shooter." The curve at the bottom of the movable jaw gives the fine crushing area. An extra long movable jaw, when reversed, gives a new fine crushing point.

The crusher is counter-balanced, counterweights being built on the flywheels to balance the great weight of the pitman and movable jaw. The Cedar Rapids crusher is said to be vibrationless in operation.

The crusher has a double adjustment, allowing the toggle seats to be aligned perfectly, and it is claimed this eliminates excessive wear on the toggle seats and minimizes bearing trouble.

The Iowa Mfg. Co. is also building a

tors, air is used only as a carrying fluid for the particles to be separated. The separation is effected by centrifugal force created by a mechanically operated rotating device which gives a uniformly graduated centrifugal action in all parts of the separating chamber, insuring a positive separation, says the company.

The centrifugal force can be increased or reduced to give products from 80 to 350 mesh and, although created independent of the circulating fan action, remains in a fixed relation to it and increasing or decreasing the separator speed; it varies the quantity but has no effect on the quality of the product.

This machine has made possible uniformly fine grades in commercial quantities, in many cases testing 300 mesh and finer.

All Gayco separators are now fitted with an enclosed dustproof head, automatic oiling system, cut steel gears, roller thrust bearing and removable babbitted shell bearings. An adjustable damper is also provided so that moderate changes in fineness can be made while the machine is in operation. These separators are designed for continuous service, and may be run for months without a shutdown and no attention other than occasionally filling the oil tank, it is claimed. The wearing parts are the gears and bearings and as these operate at comparatively slow speed they usually run several years without replacement.

A New Grizzly Feeder

THIS new grizzly feeder, says its makers, the Stephens-Adamson Mfg. Co., Aurora, Ill., finds favor where it is desirable to clear crusher materials from fine and undersized matter.

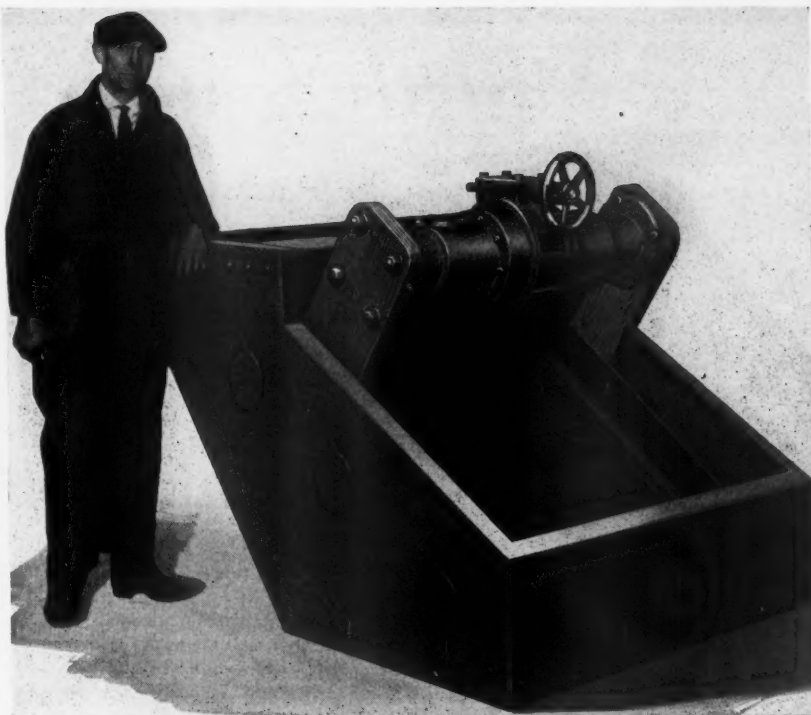


Grizzly feeder broncho type track

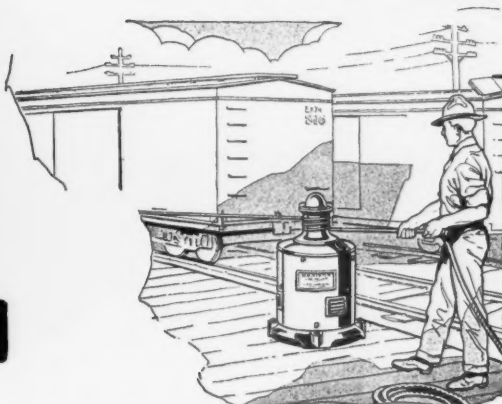
The irregular track causes constant agitation or "bucking" of the aggregate material, with the result that the fines drop through the bars very readily. Only oversize material is introduced into the crusher. The agitation of the material aids separation.

Electric Vibrating Screen

TO those confronted with the problem of classifying by volume such materials as sand and gravel, slag, etc., the C. W. Hunt Co., West New Brighton, N. Y., calls attention to its Mitchell electric vibrating screen. License to make and sell this machine has been acquired by this company, which designs and manufactures other material-handling equipment.



Electric vibrating screen. The energizing part is placed above, thus preventing water or grit from entering the case



A long shaft runs through the center, supported by the waste packed bearings. At the shaft center is keyed the rotor and at each end is keyed a hard fibre cylindrical ball cage having radial-bored round holes slightly larger than the diameter of the balls.

Encircling the fibre ball cage, pressed tightly into the casing, are hard steel ball races. In operation one or two adjacent rows of holes are filled with balls in the ball cage at each end of the shaft.

When the ball cages are rotated centrifugal force causes them to travel to the inside periphery of their races with such force that gravity is reduced, and the mechanism being free to move at its center, at the ball and socket joint, an eccentric motion is produced at either end. This motion when transmitted to the screen cloth by the vibrating plate causes a vibration of the wires in the cloth, forcing the meshes into the material 3600 times a minute.

The vibrating motion is positive and at its maximum at the ends, diminishing to practically zero at the center of vibration; the operation is quiet. By varying the number of balls in a row in the cage at the shaft ends the strength of vibration can be accurately regulated.

It is in the production of this motion that the upward drive of mesh against screening material is made possible, supplemented by the backward tossing that does so much to segregate the material.

One of the most significant features is that the energizing part is above the screen and therefore the vibrating mechanism is free from danger of getting water or grit in the case.

The outer casing is of tubular form and made up of cast-steel housings bolted with the bearing brackets to the motor frame. The mechanism is held to the main screen frame by a steel strap encircling the middle circumference of the casing; it rests at its contact with the screen frame in a ball and socket joint, the convex portion attached to the vibrator and the concave.

The casing forms a dust and waterproof housing for the motor, bearings and ball cages, therefore wear from outside influence is eliminated.

(Continued on next page)

Agricultural Limestone

(Continued from preceding page)

Greencastle, Indiana.—Analysis, 98% CaCO ₃ , 50% thru 50 mesh.....	2.00
Kansas City, Mo.—50% thru 100 mesh.....	1.50
Krause and Columbia, Ill.—Analysis, 90% CaCO ₃ , 90% thru 4 mesh.....	1.20
Lannon, Wis.—Analysis, 54% CaCO ₃ , 44% MgCO ₃ ; 99% thru 10 mesh; 46% thru 60 mesh.....	2.00
Screenings (½ in. to dust).....	1.00
Marblehead, Ohio.—Analysis, 83.54% CaCO ₃ , 14.92% MgCO ₃ ; screenings, 40% thru 100 mesh, 53% thru 50 mesh, 100% thru 10 mesh; sacks, 5.00; bulk.....	1.25
Milltown, Indiana.—Analysis, 94.41% CaCO ₃ , 2.95% MgCO ₃ ; 33.6% thru 100 mesh, 40% thru 50 mesh.....	1.25 @ 1.65
Mitchell, Ind.—Analysis, 97% CaCO ₃ , 1% MgCO ₃ ; 50% thru 100 mesh, 90% thru 4 mesh.....	1.25
Montrose, Iowa.—90% thru 100 mesh.....	1.25
Narlor, Ohio.—Analysis, 56% CaCO ₃ , 43% MgCO ₃ ; limestone screenings, 37% thru 100 mesh, 55% thru 50 mesh, 100% thru 4 mesh.....	1.50 @ 2.00
Ohio (different points), 20% thru 100 mesh; bulk.....	1.25 @ 1.50
River Rouge, Mich.—Analysis, 54% CaCO ₃ , 40% MgCO ₃ ; bulk.....	.80 @ 1.40
Stolle, Ill., near East St. Louis on I. C. R.—Thru ½-in. mesh.....	1.30
Stone City, Iowa.—Analysis, 98% CaCO ₃ ; 50% thru 50 mesh.....	.75
Toledo, Ohio.—¼ in. to dust, 20% thru 100 mesh.....	1.50
Waukesha, Wis.—No. 1 kiln dried.....	2.00
No. 2 Natural.....	1.75
Alderson, W. Va.—Analysis, 90% CaCO ₃ ; 90% thru 50 mesh.....	1.75
Cape Girardeau, Mo.—Analysis, 93% CaCO ₃ , 3.5% MgCO ₃ ; 90% thru 4 mesh.....	2.00
Cartersville, Georgia.—Analysis, 54% CaCO ₃ , 44% MgCO ₃ —all passing 10 mesh.....	1.50
Claremont, Va.—Analysis, 92% CaCO ₃ , 2% MgCO ₃ ; 90% thru 50 mesh.....	1.75
50% thru 50 mesh, 90% thru 4 mesh, 50% thru 4 mesh.....	3.00
Ft. Springs, W. Va.—Analysis, 90% CaCO ₃ ; 90% thru 50 mesh.....	2.75
Laddis, Ga.—50% thru 50 mesh.....	1.50
Garnett, Okla.—Analysis, 80% CaCO ₃ , 3% MgCO ₃ ; 50% thru 50 mesh.....	2.00
Kansas City, Mo., Corrigan Siding—50% thru 100 mesh; bulk.....	.50
Tulsa, Okla.—90% thru 4 mesh.....	1.80
	.50

Miscellaneous Sands

Silica sand is quoted washed, dried and screened unless otherwise stated.

Glass Sand:	
Berkeley Springs, W. Va.....	2.00 @ 2.25
Cedarville and South Vineland, N. J.—Damp, 1.75; dry.....	2.25
Cheshire, Mass.—Damp.....	2.50
Columbus, Ohio.....	1.50 @ 2.00
Dunbar, Pa.—Damp.....	2.25
Falls Creek, Pa.....	2.00
Hancock, Md.—Damp, 1.50; dry.....	2.50
Klondike and Pacific, Mo.....	2.25 @ 2.50
Mapleton, Pa.....	2.75
Mapleton Depot, Pa.—Damp, 2.00; dry.....	3.50
Massillon, Ohio.....	.50 @ .55
Michigan City, Ind.....	3.00
Mineral Ridge, Ohio.....	2.50
Montoursville, Pa.....	2.50
Oregon, Ill.....	3.00
Pittsburgh, Pa.—Dry, 4.00; damp.....	2.50 @ 2.75
Rockwood, Mich.....	2.25
Round Top, Md.....	2.50
Sand, Pa.....	3.00 @ 3.50
San Francisco, Calif.....	3.00
St. Mary's, Pa.....	2.50
Thayers, Pa.....	1.75
Utica, Ill.....	2.00 @ 2.50
Zanesville, Ohio.....	2.50
Foundry Sand:	
Albany, N. Y.—Core.....	1.25 @ 1.75
Furnace lining.....	2.25 @ 2.75
Molding fine, coarse and brass molding (winter shipment).....	2.25 @ 2.50
Sand blast (kiln dried).....	2.25 @ 4.00
Allentown, Pa.—Core and molding fine.....	1.75 @ 2.00
Arenzville, Ill.—Molding fine.....	1.50 @ 1.75
Brass molding.....	1.75 @ 2.00
Beach City, Ohio.—Core, washed and screened.....	2.00 @ 2.50
Furnace lining.....	2.50 @ 3.00
Molding fine and coarse.....	2.25 @ 2.50
Cheshire, Mass.—Furnace lining, molding fine and coarse.....	5.00
Sand blast.....	5.00 @ 8.00
Stone sawing.....	6.00
Cleveland, Ohio.—Molding coarse.....	1.50 @ 2.00
Brass molding.....	1.50 @ 2.00
Molding fine.....	1.50 @ 2.25
Core.....	1.25 @ 1.50

(Continued on next page)

Wholesale Prices of Sand and Gravel

Prices given are per ton, f.o.b., at producing plant or nearest shipping point

Washed Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel, ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
EASTERN:						
Ambridge and So. Heights, Pa.	1.25	1.25	1.25	.85	.85	.85
Buffalo, N. Y.	1.10	.95	.85	.85	.85	.85
Erie, Pa.	.75	.90	.75	1.10	1.15	1.15
Farmingdale, N. J.	.48	.48	.75	1.15	1.15	1.15
Hartford, Conn.	.90		1.25	1.15	1.15	1.15
Leeds Junction, Me.		.50	1.75	1.35	1.35	1.25
Machias, N. Y.	.75	.75	1.25	.85	.85	.85
Pittsburgh, Pa.	1.15	1.15	1.00	.70	.70	.70
Portland, Me.		.50	1.75	1.35	1.35	1.35
Washington, D. C.	.75	.75	1.60	1.40	1.20	1.20
(Rewashed, river)						
CENTRAL:						
Alton, Ill.		.85				
Anson, Wis.	.50	.40				.90
Barton, Wis.	.60	.60	.70	.70	.70	.70
Beloit, Wis.		.70			.80	
Chicago, Ill.	1.75 @ 2.23	1.75 @ 2.43				
Cincinnati, Ohio	.70	.65	.90	.90	.90	.90
Columbus, Ohio	.75 @ 1.00	.75 @ 1.00	.65 @ 1.00	.75 @ 1.00	.75 @ 1.00	.75 @ 1.00
Des Moines, Iowa	.50	.50	1.60	1.60	1.60	1.60
Unwashed ballast, 50 ton 60-40 sieves, .85; pebbles, .95						
			.60		.90	
Dresden, Ohio	.70	.60				
Earlestead (Flint), Mich.	.70					
Eau Claire, Wis.	.40	.40 @ .45	1.00 @ 1.25			.85 @ .98
Elkhart Lake, Wis.	.70				.80	.80
Ft. Dodge, Iowa		1.22		2.17		
Grand Rapids, Mich.		.50		.80	.70	
Hamilton, Ohio		.90			.90	
Hawarden, Iowa	.60	.50			1.60	
Hersey, Mich.	.50	.60			.75	
Indianapolis, Ind.	.60			1.50	.75 @ 1.00	.75 @ 1.00
Janesville, Wis.	.65 @ .75	.65			.65 @ .75	
Mason City, Iowa	.65	.65	1.75		.175	1.65
Mankato, Minn. (pit run).....	.60	.50	2.00	1.35		1.35
Milwaukee, Wis.	1.11	1.11	1.36	1.36	1.36	1.36
Minneapolis, Minn.	.35	.35	1.25 @ 1.35	1.25 @ 1.35	1.25	1.25
Moline, Ill.	1.00	1.00	1.30	1.30	1.30	1.30
Riton, Wis.		.40			.60	
St. Louis, Mo., f.o.b. cars.....	1.20	1.45	1.65	1.45		1.45
St. Louis, Mo., deliv. on job.....	2.05	2.20	2.35	2.15		2.10
Summit Grove, Clinton, Ind.	.65 @ .75	.60 @ .75	.60 @ .75	.60 @ .75	.60 @ .75	.60 @ .75
Terre Haute, Ind.		.60	.75	.75	.75	.75
Waukesha, Wis.	.50	.80	.80	.80	.80	.80
Winona, Minn.	.40	.40	1.25	1.25	1.15	1.15
(.05 ton discount 10 days)						
SOUTHERN:						
Atlanta, Ga.	.75	.75		.90	.90	.90
Birmingham, Ala.	1.48					
Charleston, W. Va.	all sand 1.40		all gravel 1.88			
Estill Springs, Tenn.	1.35	1.35		1.00	.85	.65
Ft. Worth, Texas	1.75	1.75	1.75	1.75	1.75	1.75
Jackson's Lake, Ala.	.50 @ .60	.50 @ .60	.40 @ 1.00	1.00	.50 @ 1.00	.50 @ 1.00
Knoxville, Tenn.	1.00	1.00	1.00	1.00	1.00	1.00
Lake Weir, Fla.		.60				
Macon, Ga.	.50 @ .75					
Memphis, Tenn.	1.00	1.00	1.80	1.80	1.80	1.80
N. Martinsville, W. Va.	1.00	1.00		1.20	1.00	.80
New Orleans, La.	.25			.85		
Roseland, La.	.50		.85	.85		
WESTERN:						
Grand Rapids, Wyo.	.50	.50	.85	.85	.80	.80
Kansas City, Mo.	(Kaw river sand, car lots, .75 per ton; Missouri river, .85)					
Los Angeles, Calif.		.70	1.20	1.20	1.10	1.10
Pueblo, Colo.	1.10*	.90*		1.50*		
San Diego, Calif.	.50 @ .70	.80 @ 1.00	1.30 @ 1.80	1.35 @ 1.65	1.10 @ 1.40	1.10 @ 1.40
San Francisco, Calif.		1.00	1.00 @ 1.20	.85 @ 1.00	.85 @ 1.00	.85 @ 1.00
Seattle, Wash.	1.00*	1.00*	1.00*	1.00*		1.00*
Spring Valley, Calif.	.70	.80	1.40	1.35	1.25	1.25

Bank Run Sand and Gravel

City or shipping point	Fine sand, 1/10 in.	Sand, ¼ in.	Gravel, ½ in.	Gravel, 1 in.	Gravel, 1½ in.	Gravel, 2 in.
Atlanta, Ga.	.30 @ .40	.30 @ .40				
Boonville, N. Y.	.60 @ .80		.55 @ .75			1.00
Cape Girardeau, Mo.			River sand, .80 per yd.			
Cherokee, Iowa			.80 per ton—1.20 washed			
Dresden, Ohio		.60				
Dudley, Ky. (crushed sand).....	1.00	1.00		.90		
East Hartford, Conn.			.65 per cu. yd.			
Elkhart Lake, Wis.	.70	.50			.60	.60
Estill Springs, Tenn.		.50 @ .65		.50 @ .65		.85
Fishers, N. Y.						.50
Grand Rapids, Mich.						
Hamilton, Ohio			.55 per cu. yd. in pit			
Hartford, Conn.		1.00*				
Hersey, Mich.					.55	
Indianapolis, Ind.			Mixed gravel for concrete work, .65			
Lindsay, Texas				.55		
Janesville, Wis.		.65		.65 @ .75		
Montezuma, Ind.			Road gravel .50 per ton			
Pine Bluff, Ark.						
Rochester, N. Y.	.60 @ .75	.60 @ .75			.50 @ .65	.50 @ .65
Roseland, La.		.75				
Saginaw, Mich. f.o.b. cars.....		.75	1.30	1.30	1.30	1.30
St. Louis, Mo.		.50	.60 gravel, 40% sand, 1.55		.50	.50
Summit Grove, Ind.	.50	.50	.50			
Waco, Texas		.80		1.50		1.30
Winona, Minn.						
York, Pa.		.95 @ 1.20				

* Cubic yard. B Bank. L Lake. || Ballast. † Low prices, wholesale; high prices, retail.

Crushed Slag

City or shipping point	Roofing	¼ in. down	¼ in. and less	¾ in. and less	1½ in. and less	2½ in. and less	3 in. and larger
EASTERN:							
Buffalo, N. Y.	2.25	1.25	1.25	1.25	1.25	1.25	1.25
E. Canaan, Conn.	4.00	1.00	2.50	1.35	1.25	1.15	1.15
Eastern Penn. and Northern N. J.	2.00	1.20	1.50	1.20	1.20	1.20	1.20
Easton, Pa.	2.50	.80	1.25	.90	.85	.80	.80
Erie, Pa.	2.25	1.25	1.25	1.25	1.25	1.25	1.25
Emporium, Pa.	2.25	1.25	1.25	1.25	1.25	1.25	1.25
Sharpsville and West Middlesex, Pa.	2.00	1.30	1.70	1.30	1.30	1.30	1.30
Western Penn.	2.00	1.25	1.50	1.25	1.25	1.25	1.25
CENTRAL:							
Chicago, Ill.			All sizes, 1.50, f.o.b. Chicago				
Detroit, Mich.			All sizes, 1.65, f.o.b. Detroit				
Ironton, O.	2.05	1.45	1.80	1.45	1.45	1.45	1.45
Steubenville, O.	2.00	1.40	1.70	1.40	1.40	1.40	1.40
Toledo, O.	1.75	1.50	1.50	1.50	1.50	1.50	1.50
Youngstown, Dover, Hubbard, Leetonia, Struthers, O.	2.00	1.25	1.35	1.35	1.25	1.25	1.25
Steubenville, Lowellville, Canton, O.	2.00	1.35	1.60	1.35	1.35	1.35	1.35
SOUTHERN:							
Ashland, Ky.		1.55		1.55	1.55	1.55	1.55
Birmingham, Ala.	2.05	.80	1.25	1.15	1.10	.95	.85
Ensley, Ala.	2.05	.80	1.25	1.15	1.10	.95	.85
Longdale, Goshen, Glen Wilton and Low Moor, Roanoke, Va.	2.50	1.00	1.25	1.25	1.25	1.15	1.05

Lime Products (Carload Prices Per Ton F.O.B. Shipping Point)

	Finishing hydrate	Masons' hydrate	Agricultural hydrate	Chemical hydrate	Ground burnt lime, Blk. Bags	Lump lime, Blk. Bbl.
EASTERN:						
Adams, Mass.			7.00			
Bellefonte, Pa.		10.50	10.50	10.50	9.00	8.50
Buffalo, N. Y.			12.00	12.00		1.80
Berkeley, R. I.			12.00			2.30
Cassadaga, N. Y.			Agricultural marl 7.00@10.00			
Chaumont, N. Y.					2.50	4.00
Lime Ridge, Pa.						5.00
West Rutland, Vt.	13.50	12.00				11.00
West Stockbridge, Mass.			10.00		10.00	6.00
Williamsport, Pa.			10.50			1.65*
York, Pa. (dealers' prices)		3.20d	10.50			
Zylonite, Mass.		2.90d	7.00			
CENTRAL:						
Cold Springs, Ohio	11.50	10.00	10.00		8.00	9.00
Delaware, Ohio	11.50	10.00	9.50			9.00
Gibsonburg, Ohio	11.50	10.00	10.00		8.00	9.00
Huntington, Ind.		10.00	10.00		8.00	9.00
Luckey, Ohio	11.50		10.00			9.00
Marblehead, Ohio		10.00	10.00			9.00
Marion, Ohio		10.00	10.00			9.00
Mitchell, Ind.				12.00	11.00	10.00
Sheboygan, Wis.					8.00	7.50d
White Rock, Ohio	11.50				8.00	10.00
Woodville, O. (dlrs.' price)	11.50a	10.00a	10.00a	11.00a		9.00
SOUTHERN:						
Erin, Tenn.						8.50
El Paso, Tex.						7.00
Karo, Va.						7.00
Knoxville, Tenn.	12.50	11.00		11.00		9.00
Ocala and Zuber, Fla.	13.00		12.00			12.00
Sherwood, Tenn.	12.50	11.00	11.00	11.00		8.50
Staunton, Va.					4.50	5.50
WESTERN:						
Colton, Calif.			15.00			19.70
Kirtland, N. M. Calif.						15.00
San Francisco	21.00	21.00	15.00	21.00		15.00
Tehachapi, Calif.						13.00

*100-lb. sacks; *180-lb. net, price per barrel; *180-lb. net, non-returnable metal barrel; \$paper sacks. (a) 50-lb. paper bags; terms, 30 days net, 25c per ton or 5c per barrel discount for cash in 10 days from date of invoice; (b) burlap bags; (c) 200-lb. barrels; (d) 280-lb. barrels net.

Miscellaneous Sands

(Continued from preceding page)

Delaware, N. J.—Molding fine	2.00
Molding coarse	1.90
Brass molding	2.15
Dunbar, Pa.—Traction, damp	2.50
Dundee, Ohio.—Glass, core, sand blast traction	2.50
Molding fine, brass molding (plus 75c for winter loading)	2.00
Molding coarse (plus 75c for winter loading)	1.75
Eau Claire, Wis.—Core	1.00@ 1.25
Sand blast	3.25@ 3.75
Falls Creek, Pa.—Molding, fine and coarse	1.75
Sand blast	2.00
Traction	1.75
Franklin, Pa.—Core	2.00
Furnace lining	2.50
Molding fine and coarse	2.00
Brass molding	2.00
Greenville, Ill.—Molding coarse	1.50@ 1.75
Joliet, Ill.—No. 2 molding sand and loam for luting purposes; milled	.80
Bank run	.65
Kansas City, Mo.—Missouri river core	.80
Kasota, Minn.—Stone sawing	1.30@ 1.50
Klondike, Pacific, Gray Summit, Mo.—Molding fine and coarse	2.00
Molding fine	2.00

Mapleton, Pa.—Glass, core, furnace lining, molding fine and coarse; damp, 2.00; dry	2.75
Massillon, Ohio.—Molding fine and coarse, furnace lining, core, traction	3.00
Michigan City, Ind.—Core, traction	.40@ .45
Mineral Ridge, Ohio.—Core (green). Furnace lining, molding fine and coarse; roofing sand, sand blast, stone sawing, traction brass molding (green)	2.25
Montoursville, Pa.—Core	1.35@ 1.40
Traction	1.00@ 1.10
Brass molding	1.25
New Lexington, Ohio.—Molding fine. Molding coarse	2.00
(.75 extra per ton for winter loading)	1.75
Oregon, Ill.—Core	1.50@ 2.00
Sand blast	4.00
Stone sawing	2.00@ 2.50
Ottawa, Ill.—Core, molding, steel, traction, roofing sand	2.00
Brass molding	3.00
Sand blast	4.00
Stone sawing	3.50
Furnace lining, molding coarse, crude	.85@ 1.00
Ottawa, Minn.—All crude silica sand.	.75@ 1.00
Rockwood, Mich.—Core	1.90@ 2.50
Roofing	2.75
Sand blast	3.75
Round Top, Md.—Core, furnace lining	1.45
Traction	1.60

(All per 2000 lb.)

Miscellaneous Sands

(Continued)

Columbus, Ohio.—Core	.50@ 1.50
Sand blast	3.50@ 5.00
Molding fine	2.75@ 3.00
Molding coarse	2.50@ 3.00
Brass molding	2.50@ 3.00
San Francisco, Calif. (washed and dried)—Core, molding fine, roofing sand and brass molding	3.00@ 3.50
(Direct from pit)	
Furnace lining, molding coarse, sand blast	3.60
Stone sawing, traction	2.30
Thayers, Pa.—Core and traction	2.00
Furnace lining	1.25
Molding fine and coarse	1.10
Utica, Ill.—Core	.85@ 1.00
Furnace lining (crude and dry)	1.00@ 1.75
Molding fine and coarse (crude and dry)	.85@ 1.75
Roofing sand	1.75
Sand blast	2.50@ 3.50
Stone sawing	2.50
Traction	1.50@ 1.75
Brass molding (crude and dry)	1.00@ 1.75
Utica, Ill.—Core, furnace lining, brass molding	1.00@ 1.75
Molding fine and coarse	.85@ 1.75
Roofing sand and traction	1.75
Sand blast	2.50@ 3.00
Stone sawing	1.75@ 2.50
Warwick, Ohio.—Molding coarse and core; dry, 3.00; green	2.00
Furnace lining and molding fine; dry, 2.75; wet	2.00
Traction and brass molding fine; dry	2.75
Zanesville, Ohio.—Molding fine, brass molding	1.50@ 1.75
Molding coarse	1.50

Talc

Prices given are per ton f.o.b. (in carload lots only), producing plant, or nearest shipping point.

Baltimore, Md.—Crude talc (mine run)	3.00
Ground talc (20-50 mesh), bags	10.00
Ground talc (150-200 mesh), bags	12.00
Cubes	50.00
Blanks (per lb.)	.07
Chatsworth, Ga.—Grinding	7.00
Ground talc (150-200 mesh); bags	15.00
Pencils and steel workers' crayons (gross)	1.50@ 2.50
Chester, Vt.—Crude talc	4.50
Ground talc (150-200 mesh), bulk	5.50@ 8.50
Emeryville, N. Y.—325 mesh (double air floated), bags	14.75
Glendale, Calif.—Ground talc (150-200 mesh)	16.00@30.00
(Bags extra)	
Ground talc (50-300 mesh)	13.50@15.50
200 mesh	13.50@14.50
Hailesboro, N. Y.—Ground talc (150-250 mesh), bags	18.00
Henry, Va.—Crude talc (lump mine run, per 2000-lb. ton)	2.75@ 3.50
Ground talc (20-50 mesh), bags	8.75@10.00
(150-200 mesh), bags	9.75@12.50
Los Angeles, Calif.—Crude talc f.o.b.	
Silver Lake	7.00@12.00
Ground talc (150-200 mesh), 100-200 lb. bags	12.00@14.00
Mertztown, Pa.—Ground talc (20-50 mesh); bulk, 5.00; bags	6.00
(150-200 mesh); bulk, 7.00; bags	8.00
Natural Bridge, N. Y.—Ground talc (150-200 mesh) bags	12.00@13.00
Rochester and East Granville, Vt.—Ground talc (20-50 mesh), bulk	8.50@10.00
(Bags extra)	
Ground talc (150-200 mesh), bulk	10.00@22.00
(Bags extra)	
Vermont—Ground talc (20-50 mesh); bags	7.50@10.00
Ground talc (150-200 mesh); bags	8.50@15.00
Waterbury, Vt.—Ground talc (20-50 mesh), bulk	5.00
(Bags 1.00 extra)	
Ground talc (150-200 mesh), bulk	8.00@14.00
(Bags 1.00 extra)	
Pencils and steel workers' crayons, per gross	1.20@ 2.00

Rock Phosphate

(Raw Rock)

Per 2240-lb. Ton

Centerville, Tenn.—B.P.L. 65%	6.00@ 8.50
B.P.L. 65%	6.00
Gordonsburg, Tenn.—B.P.L. 68-72%	4.50@ 5.00
Tennessee—F.o.b. mines, long tons, unground Tennessee brown rock, 72% B.P.L.	7.00
Mt. Pleasant, Tenn.—Analysis, .65-70% B.P.L. (2000 lb.)	6.50
Paris, Idaho.—2000 lb. mine run, B.P.L. 70%	3.25@ 3.50

(Continued on next page)

Roofing Slate

The following prices are per square (100 sq. ft.) for Pennsylvania Blue-Gray Roofing Slate, f. o. b. cars quarries:

Sizes	Genuine Bangor, Washington Big Bed, Franklin Big Bed	Genuine Albion	Slatington Small Bed	Genuine Bangor Ribbon
24x12.....	\$10.20	\$8.40	\$8.10	\$7.50
24x14.....	10.20	8.40	8.10	7.50
22x12.....	10.80	8.70	8.40	7.80
22x11.....	10.80	8.70	8.40	7.80
20x12.....	12.60	9.00	8.70	8.10
20x10.....	12.60	9.00	8.70	8.10
18x10.....	12.60	9.00	8.70	8.10
18x 9.....	12.60	9.00	8.70	8.10
16x10.....	12.60	8.70	8.40	7.80
16x 9.....	12.60	8.70	8.40	7.80
16x 8.....	12.60	8.70	8.40	7.80
18x12.....	12.60	9.00	8.70	8.10
16x12.....	12.60	8.70	8.40	7.80
14x10.....	11.10	8.40	8.10	7.50
14x 8.....	11.10	8.40	8.10	7.50
14x 7 to 12x6.....	9.30	8.10	7.50	7.50
24x12.....	Mediums \$ 8.10	Mediums \$8.10	Mediums \$7.20	Mediums \$5.75
22x11.....	8.40	8.40	7.50	5.75
Other sizes.....	8.70	8.70	7.80	5.75

For less than carload lots of 20 squares or under, 10% additional charge will be made.

(Continued from preceding page)

(Ground Rock)

Wales, Tenn.—B.P.L. 70%.....	7.75
Per 2000-lb. ton	
Barton, Fla.—Analysis, 50-65% B.P.L. 3.50@	8.00
Centerville, Tenn.—B.P.L., 60-65%.....	6.50
B.P.L. 75% (brown rock).....	12.00
Columbia, Tenn.—B.P.L. 68-72%.....	5.50
B.P.L. 65% (90% thru 200 mesh) bulk.....	5.50
Montpelier, Idaho.—Analysis, 72% B.P.L., crushed and dried.....	3.75
Mt. Pleasant, Tenn.—B.P.L. 65%.....	5.50
Twomey, Tenn.—B.P.L. 65%.....	6.50

Florida Soft Phosphate

(Raw Land Pebble)

Per Ton	
Florida—F. o. b. mines, long ton, 68/66% B.P.L.	3.00
68% (min.).....	3.25
70% (min.).....	3.50
Jacksonville (Fla.) District.....	10.00@12.00

(Ground Land Pebble)

Per Ton	
Jacksonville, Fla., District.....	14.00
Add 2.50 for sacks.....	
Morristown, Fla.—26% phos. acid.....	16.00
Mt. Pleasant, Tenn.—65-70% B.P.L.	5.00@ 6.00

Fluorspar

Fluorspar—80% and over calcium fluoride, not over 5% silica; per ton f.o.b. Illinois and Kentucky mines.....	20.00
Fluorspar—85% and over calcium fluoride, not over 5% silica; per ton f.o.b. Illinois and Kentucky mines.....	21.50

Special Aggregates

Prices are per ton f. o. b. quarry or nearest shipping point.	
City or shipping point	
Chicago, Ill.—Stucco chips, in sacks f.o.b. quarries.....	17.50
Deerfield, Md.—Green; bulk.....	7.00
Easton, Pa.—Evergreen, creme green and royal green marble.....	10.00@16.00
Slate granules.....	16.00@18.00
Granville, N. Y.—Red slate granules.....	8.00@ 9.00
	7.50

Harrisonburg, Va.—Blk. marble (crushed, in bags).....	12.50
Ingomar, Ohio (in bags).....	10.00@25.00
Milwaukee, Wis.	16.00@30.00
New York, N. Y.—Red and yellow Verona.....	32.00
Middlebrook, Mo.—Red Phillipsburg, N. J.—Green stucco dash.....	20.00@22.00
Poultney, Vt.—Slate granules.....	7.50
Red Granite, Wis.	7.50
Sioux Falls, S. D.	7.50
Tuckahoe, N. Y.	12.00@20.00
Whitestone, Ga.—White marble chips, net ton in bulk, f.o.b., bags 12½¢ extra.....	4.50

Concrete Brick

Prices given per 1000 brick, f.o.b. plant or nearest shipping point.

	Common	Face
Appleton, Minn.	20.00	25.00@35.00
Birmingham, Ala.	13.30	21.75
Carpenterville, N. J.	16.00	31.50@40.00
Easton, Pa.	16.00	40.00@60.00
Eugene, Ore.	25.00@26.00	50.00@75.00
Friesland, Wis.	22.00	32.00
Houston, Tex.	19.50	
Omaha, Neb.	16.00	30.00@40.00
Portland, Ore. (Del'd).....	21.00	45.00@60.00
Puyallup, Wash.	20.00	40.00@75.00
Rapid City, S. D.	18.00	25.00@40.00
St. Paul, Minn.	15.00	30.00@37.00
Salem, Ore.	25.00	35.00@50.00
Salt Lake City, Utah.....	17.00@18.00	35.00@40.00
Springfield, Ill.	18.00	20.00@25.00
Wauwatosa, W.	13.00@14.00	28.00@75.00
Watertown, N. Y.	18.00@20.00	32.00@35.00
Winnipeg, Can.	18.00	26.00

Sand-Lime Brick

Prices given per 1,000 brick f. o. b. plant or nearest shipping point, unless otherwise noted.	
Barton, Wis.	11.00
Boston, Mass.	15.00@16.50
Buffalo, N. Y.	16.50
Dayton, Ohio.....	12.50@13.50
El Paso, Texas.....	14.00
Grand Rapids, Mich.	12.25
Lancaster, N. Y.	14.00
Michigan City, Ind.	11.00
Milwaukee, Wis. (delivered).....	14.00
Minneapolis, Minn.	13.00
Plant City, Fla.	10.00

Redfield, Mass.	15.00
Rives Junction, Mich.	11.00
Saginaw, Mich.	12.00
San Antonio, Texas—Common.....	15.00
South Dayton, Ohio.....	12.50@13.50
Syracuse, N. Y. (delivered at job).....	18.00
f.o.b. cars.....	14.00
Washington, D. C.	14.50

Lime

Warehouse prices, carload lots at principal cities.

	Hydrate per Ton	Common
Finishing		
Atlanta, Ga.	23.00	20.00
Baltimore, Md.	22.00	16.25
Cincinnati, Ohio.....	15.80	13.30
Chicago, Ill.	18.00	18.00
Dallas, Tex.	22.50	
Denver, Colo.	24.00	
Detroit, Mich.	19.50	17.50
Kansas City, Mo.	25.60	24.00
Minneapolis, Minn. (white).....	25.50	21.00
Montreal, Que.	21.00	
New Orleans, La.	17.25	
New York, N. Y.	16.80	13.10
Philadelphia, Pa.	15.50	14.50
St. Louis, Mo.	21.40	19.20
San Francisco, Calif.	22.00	16.00
Seattle, Wash. (paper sacks).....	24.00	

	Lump per 180-lb. Barrel (net)	Common
Finishing		
Atlanta, Ga.	2.25†	1.85†
Cincinnati, Ohio.....	1.50†	10.75†
Chicago, Ill.	1.50†	1.40†
Dallas, Tex.		2.50†
Denver, Colo.		2.70†
Detroit, Mich.	2.40†	18.25†
Kansas City, Mo.	2.40†	2.40†
Minneapolis, Minn.	15.00†	11.00†
Montreal, Que.	2.40†	
New Orleans, La.	3.75*	3.00@3.25*
New York, N. Y.	13.00†	12.00†
Philadelphia, Pa.	17.75	17.75†
St. Louis, Mo.	2.80†	
San Francisco, Calif.		
Seattle, Wash.		

*Per 280 lb. bbl. (net). †Per 180-lb. bbl. (net). ‡Per ton. Refund of 10¢ per bbl. Minneapolis quotes brown common lump lime: Kelly Island white is \$1.55, Sheboygan, \$1.45. New York quotes hydrated lime "on cars" in paper sacks; lump lime "alongside dealers' docks" or "on cars."

Portland Cement

Current prices per barrel in carload lots f. o. b. cars, without bags.

Atlanta, Ga.	2.80
Boston, Mass.	2.68
Cedar Rapids, Iowa.....	2.48
Cincinnati, Ohio.....	2.54
Cleveland, Ohio.....	2.46
Chicago, Ill.	2.20
Dallas, Tex.	2.25
Davenport, Iowa.....	2.43
Denver, Colo.	2.65
Detroit, Mich.	2.47
Duluth, Minn.	2.14
Indianapolis, Ind.	2.41
Kansas City, Mo.	2.45
Los Angeles, Calif.	2.56
Milwaukee, Wis.	2.39
Minneapolis, Minn.	2.37
Montreal, Can. (sacks 20¢ extra).....	2.40
New Orleans, La.	2.83
New York, N. Y.	2.30
Phoenix, Ariz.	3.70
Pittsburgh, Pa.	2.24
Portland, Ore.	3.05
San Francisco, Calif.	*3.03@3.55
St. Louis, Mo.	2.35
St. Paul, Minn.	2.39
Seattle, Wash.	2.90
Toledo, Ohio.....	2.48

NOTE—Add 40¢ per bbl. for bags.

**+warehouse.

Gypsum Products—CARLOAD PRICES PER TON AND PER M SQUARE FEET, F. O. B. MILL

	Cement‡ and Gauging Plaster									4x32x36"	3x32x36"	3x32 or 48"
	Crushed Rock	Ground Gypsum	Agri-cultural Gypsum	Stucco* Calcin'd Gypsum	Weight 1500 lb. Per M Sq. Ft.	Wood Fiber	White\$ Gauging	Sanded Plaster	Keene's Cement	Trowel Finish	Weight 1850 lb. Per M Sq. Ft.	Lengths 6'-10', 1850 lb. Per M Sq. Ft.
Douglas, Ariz.		6.00	6.00		13.00							
Fort Dodge, Iowa.....	3.00	3.50	6.00	8.00	10.50		20.00		21.30	20.00	20.00	30.00
Garbutt, N. Y.			6.00	8.00	10.00			7.00			20.00	
Grand Rapids, Mich.	3.00		5.00	10.00	10.00				31.00		19.75	30.00
Hanover, Mont.	4.50		6.00	10.00	10.50							
Mound House, Nev.		8.50	6.50	10.50@11.50								
Oakfield, N. Y.	3.00	4.00	6.00	8.00	10.00		20.20	7.00+	30.75	21.00	19.375	30.00
Rapid City, S. D.	4.00		10.00	11.00	11.50				33.75			
San Francisco, Calif.				16.40								
Winnipeg, Man.	5.50	5.50	7.00	13.50	15.00						28.50	35.00

NOTE—Returnable Jute Bags, 15¢ each, \$3.00 per ton; Paper Bags, \$1.00 per ton extra.

*Shipment in bulk 25¢ per ton less; †Bond plaster \$1.50 per ton additional; +Sanded Wood Fiber \$2.50 per ton additional; \$White Moulding 50¢ per ton additional; ‡Bulk; (a) Includes sacks.

News of All the Industry

Incorporations

The Casper Gravel Co., Casper, Wyo., has been incorporated for \$50,000 by R. M. Bartholomew and H. B. Doll.

The El Cerretto Quarry Co., Oakland, Calif., has been incorporated for \$25,000 by L. L. Lucas, M. S. Foss, A. Pelosi, B. Rarnero, G. Ollino, and C. Pastrona. E. E. Keys, attorney, Federal Realty building.

The Pacific Coast Phosphate and Lime Co., Boise, Idaho, has been incorporated for \$1,000,000 by F. S. Irwin, Moscow; W. H. Nonenfenger and D. E. Sanders, Spokane, Wash.

The Spartanburg Quarries Corp. has been incorporated for \$50,000 in Pacolet, S. C., to operate a granite quarry on Pacolet river. B. T. Earle is president.

The Agricultural Co-operative, Inc., Boston, Mass., has been incorporated for \$10,000 by H. Simons, president; S. D. Green, treasurer, and H. Seidman.

The Melville Quarry Co., Ltd., Toronto, has been incorporated for \$70,000.

The White Crystal Lime Co., Ltd., Regina, Sask., has been incorporated for \$50,000.

The Cana Stoneite Corp., Ltd., Winnipeg, Man., has been incorporated by J. K. Johnson, H. Pearson and C. Jackson for \$500,000.

The Greenburn Sand and Gravel Co., Ltd., Toronto, has been incorporated for \$25,000.

The Toronto Cement Corp., Ltd., Toronto, has been incorporated for \$3,000,000.

The United Sand and Gravel Co., Ft. Wayne, Ind., has been incorporated for \$25,000 to deal in sand, gravel and building materials. Directors are F. Bubelhar, F. M. Hogan and K. J. Stone.

The Orofino Lime and Fertilizer Co., Orofino, Idaho, has been incorporated for \$25,000 by W. H. and G. D. Zumwalt, C. W. and W. L. Matthews and J. M. Gilmore.

The Stonington Granite Corp., Stonington, Maine, has been incorporated for \$100,000 by B. L. Noyes, president; G. B. Noyes, Jr., treasurer, and G. H. Noyes, Stonington, to conduct a general granite business.

The Victoria Development Co., Wilmington, Del., has been incorporated for \$600,000 by T. L. Croteau, M. A. Bruce and A. M. Hoover to quarry for gypsum, lime and cement.

The East Flatbush Stone Corp., Brooklyn, N. Y., has been incorporated for \$5,000 by De V. Chilton and A. J. Clayton.

The Rockydale Stone Co., Inc., Roanoke, Va., has been incorporated for \$75,000, to mine and deal in stone, lime, metals and minerals of all kinds. G. B. Pace, president; W. V. Gregory, secretary; and S. B. Pace.

Sand and Gravel

The Petersburg Sand and Gravel Corp., Petersburg, Va., announces that it is now operating another plant under the name of the Dixie Sand and Gravel Corp.

The Birmingham Sand and Gravel Co., Birmingham, Ala., will build a warehouse two stories high.

Chillicothe, Ohio.—The East End Sand and Gravel Co., whose plant was recently destroyed by fire, hopes to have the plant in operation in a short time. The new boiler and engine have arrived and a gravel screening machine will also be installed.

The New England Sand and Gravel Co., Boston 9, Mass., operators, of the New England Concrete Products Co. and Moore Sand and Gravel Co., announces the removal of its offices from 61 Devonshire street to larger quarters at 294 Washington street.

The Urbana Gravel Co., Urbana, Texas, has changed its name to Urbana Sand and Gravel Co., and increased its stock from \$30,000 to \$50,000.

The Star Sand and Gravel Co., near Waco, Tex., has been organized by V. Cornish and W. C. Woodlock. The plant will furnish washed, screened gravel and sand, also remixed sand and gravel and county road material.

Columbus, Ohio.—The Mt. Calvary Gravel and Sand Co., has been awarded the contract by the city board of purchase for 1000 tons river bank sand, delivered prices ranging from \$1.25 to \$2.30.

Evansville, Ind.—The trustees of the Indiana Reformatory have let the contract for a gravel washing machine costing about \$20,000. The contract was let to firms in Milwaukee, Wis., Chicago, and Aurora, Ill. It is expected that the machine will be delivered shortly.

Shawneetown, Ill.—A busy season is looked for here. The local gravel plant and those on the Wabash river at Grayville, Ill., expect to have all the work they can do. A great deal of the gravel being contracted for will be used in road improvement work in Southern Illinois.

The Pleasant Lake Sand and Gravel Co., near Pleasant Lake, Ind., has been incorporated for \$60,000 by C. M. Wood, F. I. Hammer, D. Triplehorn, N. Wood and H. N. Wood. The property is 200 acres, with more than 25,000,000 yd. of sand and gravel. Equipment, including dredging barges and washing machinery, with a capacity of 50 carloads a day, has been installed.

The Hesperides Washed Sand Co., Lake Wales, Fla., has purchased a site near Templeton and will install a new plant.

The White Marsh Sand and Gravel Co., White Marsh, Md., has increased its capital stock to \$10,000.

The Ohio River Gravel Corp., operating plants at Wheeling, New Martinsville, Parkersburg, W. Va., and Marietta, Ohio, has facilities to furnish materials for building and construction work. There are storage bins with 20,000-ton capacity of sand and gravel when river and weather conditions prevent dredging. The bins have a steam-heating system for winter loading.

The Pilot Knob Gravel Co., Winchester, Ky., has decreased its capital from \$250,000 to \$160,000, and changed its name to Pilot Knob Sand and Gravel Co.

The North Western Gravel Co., Lake View, Ia., is opening a plant at Cherokee to cost from \$60,000 to \$75,000. The company will have bins for sized gravel loading. Oversized gravel will be crushed and water pumped from the river for washing.

The Long-Bell Lumber Co., near Longview, Wash., is preparing to install a gravel washing plant at a pit from which it is taking gravel used as a filler in Longview streets.

J. H. Halligan, right-of-way agent for the Frisco Railway, will open a gravel pit in the suburbs of Foreman, Ark. The company purchased 40 acres of land containing a large gravel deposit. A switch will be laid to the pit, and gravel will be used on the Frisco railroad from Hope, Ark., to Ardmore, Okla.

The Penglass Engineering Co., Grayville, Ill., left its gravel fleet at Crawleyville, Ind., where 2500 yd. of gravel was pumped for Indiana road work. Later its fleet was sent to New Harmony where 400 yd. of gravel was taken out of the Wabash river for road construction work.

The Eastwood Sand and Gravel Co., Grayville, Ill., has launched two new boats and by April 15 it is expected two new barges will be launched for the summer's operation. Machinery for the new plant is expected soon. Laying the side track from the plant to the Wabash river will be started shortly.

Phosphate Rock

The Southern Phosphate Corp., Boston, Mass., offered its stockholders of record March 19, the right to subscribe at \$5 a share to one new share for each share owned, which expired March 30. This will raise approximately \$599,000, of which \$500,000 with 3846 shares of stock will be used to discharge contract obligations. The report for 1922 shows a net income of \$82,036 before reserves for depreciation, depletion and obsolescence for which there was no cash expenditure. The reserves totaled \$198,966, which is a net charge to surplus of \$116,929. The balance sheet shows the assets were \$469,600, current liabilities \$363,603, leaving a net working capital of \$105,996. This will increase the net current asset to approximately \$186,000, including \$100,000 cash.

Cement

The Sarnia Cement plant, Sarnia, Ont., owned by W. Reid and recently destroyed by fire, will be rebuilt.

The Lehigh Portland Cement Co., Allentown, Pa., is pushing construction on its mill at Tarrant City, Ala., and expects to have the plant operating late in May. The company is maintaining active production at its Lehigh Valley mills.

The Atlas Portland Cement Co. is operating at full capacity its large mill at Northampton, Pa., and will maintain this schedule indefinitely.

The Phoenix Portland Cement Co., Nazareth, Pa., is preparing for early operations at its new plant at North Birmingham, Ala. It expects to have it running at full capacity within 60 days. The plant has a rated capacity of 1,000,000 bbl. per year. The company is operating its plants at Nazareth at full capacity.

The San Jose Lime and Cement Co. will construct a \$2,500,000 plant, it is reported in the San Francisco "Journal," March 28.

The National Cement Co., 90 St. James street, Montreal, Quebec, recently incorporated for \$4,000,000, is preparing to erect a plant.

The Bessemer Limestone and Cement Co., Bessemer, Pa., closed down February 1 for necessary machinery repairs, but will resume operations shortly. It is proposed to perfect arrangements for increased production. The plant was completed a little over a year ago and has been operating continuously since that time.

The Dixie Portland Cement Co., Chattanooga, Tenn., proposes to expend about \$200,000 on improvements this year.

Quarries

The Centredale Granite Co., Inc., Providence, R. I., has increased its capital stock from \$15,000 to \$50,000.

The R. B. Tyler Crushed Stone Co., Louisville, Ky., has increased its stock from \$100,000 to \$150,000.

The Northwestern Sand and Gravel Co., Des Moines, Iowa, has purchased the lease of the Philip Cozzie quarry and 50 additional acres at Marshalltown and will erect a stone crushing plant costing \$100,000 to manufacture railway ballast and crushed stone for road building.

Clarkston, Wash.—The Asotin county board has made preparations for graveling the state road and new bunkers and equipment have been installed at the rock quarries here.

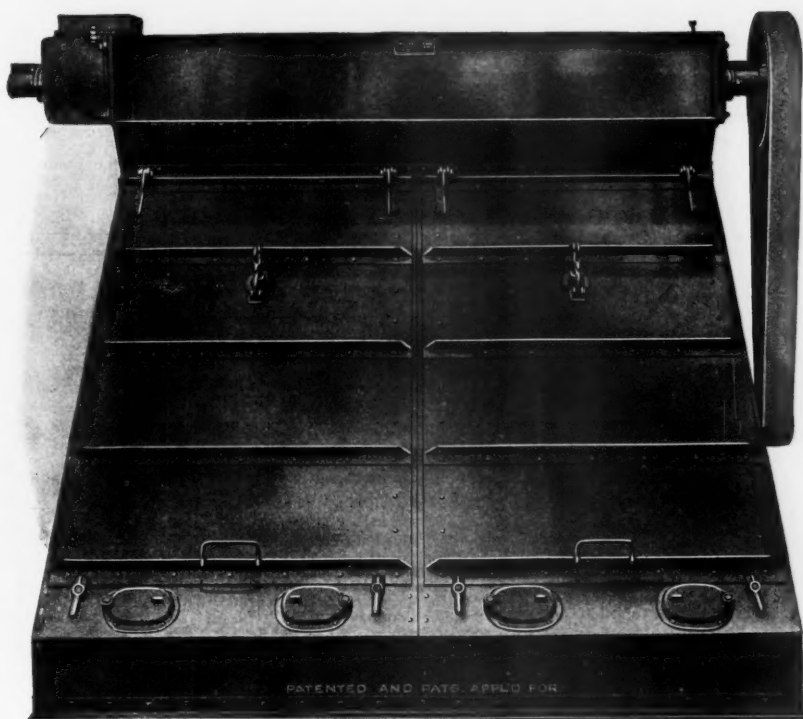
The Veruga Marble Co., San Diego, Calif., at its annual meeting elected the following officers: W. C. Harlow, Coronado, president; W. H. Whiteside, chairman of board, Pasadena; F. G. Webb, vice-president and general manager, San Diego; G. O. Noble, Los Angeles and W. B. Gross, San Diego, secretary. The company is increasing its output to one carload more a day. The marble marketed by the company is found in only three places in the world—the island of Paros, in the Aegean sea; in Georgia and southern California. It is a fine grade and used for both inside and outside construction work, and was used for the Lincoln monument in Washington. The increase in demand for it will make the company one of the largest shippers in the world.

Spokane, Wash.—Inland Empire granite, quarried in the vicinity of Dishman, is being considered as a possible material to be used for the base of the Lincoln memorial. It is proposed to unveil in Spokane in June during the Washington and Alaska G. A. R. encampment. The granite from the Dishman quarries is of uniform color, without defects and is said to be equal to any quarried in the country.

The Aquia Creek Quarries, Alexandria, Va., according to reports, have been purchased by a group of capitalists and will be reopened shortly after having been idle for more than a century. More than 200 skilled mechanics will be employed in the Agnew shipyard, which has also been purchased for use in connection with fitting the material for market. Richmond, Washington and New York capitalists are interested in the project. Much of this stone was used in the first public building in Washington, which are still standing.

(Continued on page 58)

STURTEVANT



MOTO-VIBRO SCREEN

PRICE ABOUT ONE-HALF OF OTHERS

Because unnecessary and costly auxiliaries and complications, delicate, expert adjustments, dangerous wire stretching and destructive flexing

HAVE BEEN ENTIRELY ELIMINATED

The result is a screen that is a model for simplicity, accessibility, durability and one that has an evenly distributed, non-destructive yet

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that is noiseless, of small amplitude and of scientific efficiency.

Compare it with others for looks, action, price, quality, capacity or accuracy.

OPERATED ELECTRICALLY OR BY BELT

Unit construction—one, two or three Screens.

Sold on approval with or without competitors. It is in a class by itself and you are the judge.

STURTEVANT MILL CO. HARRISON SQUARE **Boston, Mass.**

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The Liberty Lime and Stone Co., Clifton Forge, Va., has increased its capital stock from \$150,000 to \$300,000.

Frank P. Carle will develop shale deposits near San Antonio, Texas.

The Vancouver Granite Co. has re-opened its quarry on Nelson Island, after being idle two months. It is expected work will continue throughout the year. George Donahue is manager.

E. B. Baker, Dover, Ohio, will erect a raw lime pulverizing plant at the Finzer Clay and Coal Co. plant. Work will begin at once to erect a plant.

The River Products Co., Iowa City, Iowa, has increased its capital stock from \$100,000 to \$250,000. The company gets its limestone from the Iowa river ledges. The directors plan to enlarge the plant to meet the increasing demand for crushed rock for paving, and limestone screenings for farm soils.

The Ziegler and Dalton Construction Co., Abilene, Kas., has completed its rock crushing plant near Junction City, and expects to start work on spring orders soon.

The Kohler-Zook Rock Co. will erect a 100-ton rock crusher east of Kansas City to supply local building contractors with crushing rock.

The Western Granite Co., Seattle, Wash., has a contract for granite to be used in constructing the Terminal Sales building for the Pacific Warehouse Co. This granite, C. J. Carlson, manager of the company, stated, will come from British Columbia. Granite will also be furnished for the Chalen county courthouse, and will come from the company's quarries at Index.

Victor Forsgren, Ft. Smith, Ark., has purchased a site and equipment for a rock crusher producing 100 cu. yd. per day. Stone from ¾ to 2 in. will be produced.

The Pittsburgh Plate Glass Co.'s chemical plant, Barberton, Ohio, may have direct rail service from the limestone plant at Fultonham if, as reported, the Wheeling and Lake Erie railway extends its line from Zanesville to Fultonham, and possibly further down into the mining regions of southeastern Ohio. The material is now being hauled from Fultonham to Zanesville over the Zanesville and Western, and then to Barberton. The railway company will probably carry the output of the new cement plant about to be constructed for the Pittsburgh Plate Glass interests, as well as the output of the limestone plant, if this line is built.

Lime

C. and J. Camp, Ocala, Fla., phosphate operators, will erect a lime plant near here, the second big lime plant to be erected in Marion county within a few months. The other plant, near Kendrick, is owned by the Cummer Lumber Co., Jacksonville.

The Waco Lime and Products Co., Waco, Texas, has completed plans for a new plant. The company was recently incorporated for \$400,000. The initial production will be 100 tons a day of lime and lime products. Automatic equipment will be installed, and the main building will be 300x46 ft., and nearly 90 ft. high.

The Guadalupe Lime and Cement Co., 16 California street, San Francisco, is planning the erection of a new plant in the vicinity of San Jose, Calif., to cost about \$250,000 with machinery. A power house and machine shop will be erected.

The Rockdale Lime Co., Housatonic, Mass., has started operations. The plant will be operated electrically. A 300-hp. motor has been installed.

The Union Carbide Co. has broken ground at Sault Ste. Marie, Ont., for a new lime plant, the cost of which will be approximately half a million dollars.

Concrete Products

Springlake, N. J.—The Concrete Products Co. of New Jersey is installing machinery to double its output. In addition, a pole line to furnish electric power and lights has been contracted for. The main building is being enlarged, and an office building will be erected. Three more steam kilns have been added, making nine in all. Additional yard tracks have been laid and the yard layout rearranged for more economical handling of the product.

The Concrete Products Co., Hillsboro, Ore., has been incorporated for \$30,000 by R. L. Tucker and others.

The Cement Products Mfg. Co., Roanoke, Va., has been incorporated for \$30,000 by E. H. Pearl, president; E. A. Buchanan, secretary.

The Fourlock Tile Co., Baltimore, Md., has organized with F. E. Holt, president; W. L. Broman, vice-president, Wilmington, Del.; F. H.

Carter, secretary, and P. Eckels, treasurer, Baltimore.

The V. and M. Concrete Products Co., St. Clairsville, Ohio, has been incorporated for \$15,000 by C. A. Morgan.

The Tulsa Concrete Products Co., Tulsa, Okla., has been incorporated for \$5000 by E. M. Lightfoot, C. E. Lightfoot and Cora Lightfoot, all of Tulsa.

Kennewick, Wash.—G. G. Bier has purchased the interests of H. G. Fyfe and W. W. Whiting in the Edwards, Fyfe Co., manufacturers of concrete pipe, and will devote all his time to the business.

The Barnesville Concrete Products Co., Barnesville, W. Va., is being organized and plans to erect a plant for manufacturing concrete products of all kinds are being completed. Incorporators are J. Getsinger, E. Parsons, F. Robinson, E. J. Patterson, O. M. Smith and W. Kennard.

The New England Concrete Products Co., Boston, Mass., has completed its plant and is now manufacturing "Waterseal" concrete roofing tile.

The Cement Stone and Supply Co., Wichita, Kans., of which H. B. Gilkerson is president, purchased the Trusswall Mfg. Co., Kansas City, to obtain patent rights to an artificial stone process and has purchased a site for a plant costing \$40,000 at Rosedale.

The Concrete Pipe Co., Inc., New Orleans, La., a \$75,000 corporation, has completed its plant and is now producing concrete pipes, which are finding a ready market. Col. C. L. Dulin is vice-president.

The Barnskan Concrete Products Co., Detroit, Mich., has been incorporated for \$100,000.

The Acme Concrete Products and Gravel Co. has been incorporated for \$300,000 and succeeds the Acme Concrete Products Co., Cement City, Mich.

The Independent Concrete Pipe Co., Woodstock, Ont., is erecting a one-story branch plant at Toronto with about 20,000 sq. ft. of floor space. J. Carnwath will manage the Toronto plant; the J. E. Russell Co., Ltd., is the selling agent.

The Erie Brick and Cement Products Co., Sandusky, Ohio, has filed application for incorporation and will take over the plant of the Hinde Brick and Tile Co., West Sandusky.

Oscar Anderson, Sandpoint, Idaho, formerly engaged in the manufacture of brick at that town, has purchased the complete manufacturing equipment of the Star Brick and Tile Co., Mt. Vernon, Wash., and will begin operations as soon as the machinery can be moved and set up.

The National Stone Tile Co., San Francisco, Calif., operating 40 plants to capacity throughout the west, are contemplating the erection of a new plant at Boise, Idaho.

Gypsum

The Gipsolite Co., Inc., Batavia, N. Y., manufacturers of building board products, is planning enlargements to double the present capacity. A list of machinery will soon be arranged. J. F. Haggerty is president.

The Niagara Gypsum Co., Buffalo, N. Y., will build a one-story addition 60x250 ft. to its plant at Oakfield, N. Y., to cost, with machinery, from \$150,000 to \$200,000.

Magnesite

The Universal Magnesite Products Co., Escanaba, Mich., recently organized to manufacture magnesite flooring specialties, etc., is planning to install machinery in a factory which has been leased. L. K. Edwards, president; and L. J. Jacobs, treasurer.

Rock Asphalt

F. M. Spiller, Hartselle, Ala., connected with a large Kentucky asphalt company, after a year of asphalt prospecting, secured leases for asphalt lands in Morgan, Colbert and Lawrence counties, and announces his company will erect five factory sites near railroad facilities in these counties, one at Hartselle. The company has drilled in this section and the product was found equal to the Kentucky product.

The Standard Asphalt Co., Kansas City, Mo., has taken over the rock asphalt plant at Ada, Okla., and will build a modern plant for developing the natural resources.

Topeka, Kans.—A. Steinberger, trustee for the Ada Rock Asphalt Co., Tulsa, Okla., has interested the Topeka Chamber of Commerce in his plans to open a plant here. A delegation probably will go to Ada, Okla., soon, to inspect the company's rock asphalt mine.

Personal

Charles A. McNall, formerly assistant engineer of the New York Central railroad, has accepted position of superintendent with the Albany Crushed Stone Corp.'s plant at Selkirk, N. Y.

George A. Olsen, formerly associate editor of "Barrel & Box" and "Lumber and Veneer Consumer," has joined the editorial staff of "Building Supply News." His new position will be that of merchandising editor. Mr. Olsen is well known in the building supply field, having been editor of "Dealers' Building Material Record," and later of Rock Products. Following these editorial activities, Mr. Olsen was executive secretary of the Chicago Building Material Dealers' Exchange, field secretary for the National Builders' Supply Association, and executive secretary of the Wisconsin Fuel Merchants and Building Material Dealers' Association. In this latter capacity, he increased the membership to 442 members, larger by 300 than any organization of these groups had ever been before. During the World War, Mr. Olsen was instrumental in promoting the effective distribution of coal and of necessary building materials throughout Wisconsin, despite the multitudinous embargoes. Since his return to Chicago in 1922, he has kept in close contact with the retail field, in which he has a personal acquaintance of nation-wide proportions.

William M. Kinney, general manager of the Portland Cement Association, during a recent visit in Dallas, Texas, said that construction activities approximating \$100,000,000 will be carried out in that state this year. "There will be no letup in building activities in this section," he said. The demand for dwellings and apartments is such that they will cost in the neighborhood of \$10,000,000.

Manufacturers

The Mathieson Alkali Works, Saltville, Va., deciding to use pulverized coal, have contracted with the Fuller Engineering Co., Fullerton, Pa., for the design and installation of a complete coal pulverizing plant, which will comprise Fuller indirect fired driers, Fuller mills, Fuller-Kinyon transport system, and Fuller burners and feeders.

The Emerson Pump and Valve Co., Inc., Alexandria, Va., announces that its management is now vested in M. H. Avrani & Co., Inc., engineers and industrial managers, 360 Madison avenue, New York City. J. N. MacLaren, second vice-president of the latter company, is general manager.

Clifford F. Messinger, for the past three years general sales manager of the Chain Belt Co., Milwaukee, has been elected second vice-president. Mr. Messinger was graduated from the Sheffield Scientific School, Yale University, in 1911 and entered the employ of the company the same year. He has at various times been advertising manager, manager of concrete mixer sales and general sales manager. He is also a director of the company and a director of the Interstate Drop Forge Co., Milwaukee.

Major Frederic E. Wheeler, formerly president of Finlay-Wheeler, Inc., contractors' equipment dealers of Buffalo and Rochester, N. Y., has joined the Chicago sales staff of the Blaw-Knox Co., Pittsburgh. Major Wheeler is well qualified to handle the Blaw-Knox line by reason of his four years' experience as general manager of Finlay-Wheeler, the Blaw-Knox sales representatives in western New York. For three years he was superintendent of construction for the Donner Steel Co., after two years as resident engineer for the Erie railroad at Huntington, Ind. During the World War he served as first lieutenant in the 302d Field Artillery in the St. Mihiel salient and in the Meuse-Argonne offensive. In 1922 he was appointed a major in the New York National Guard.

New Westinghouse Publications—The Westinghouse Electric and Mfg. Co., East Pittsburgh, Pa., has issued the following leaflets for the trade: 1161-A—Large Squirrel-Cage Induction Motors, Type CS; 3400—Type F-10 Oil Circuit-breakers; 1611—Type AF Automatic Auto-starters for Polyphase Squirrel-Cage Induction motors; 1765—Motors for Westinghouse-Baldwin Mine Locomotives (900 Series); 2390-A—Type E Engine-driven Alternating-current generators; 3499-A—Type CS contact switches.

A FORD in the Pump Field

After heavy rains, flooded basements in the business districts of Portland, Oregon are pumped out with Evinrude Centrifugals.

**Disposes
of Water
You Don't
Want**



THE Evinrude Centrifugal Pump does its work at a lower cost than any other pumping outfit made. It goes where other pumps cannot follow. May be lowered into ditch, excavation or caisson and submerged in the water. Pumps 5,000 gallons an hour at a 20 foot head — with or without a suction line. Requires no "installation".

Wherever there's drainage water to be disposed of—in basements, building excavations, mines, quarries, gravel pits—an Evinrude will do the job quickly, efficiently and economically. Bridge builders use it for emptying coffer dams,

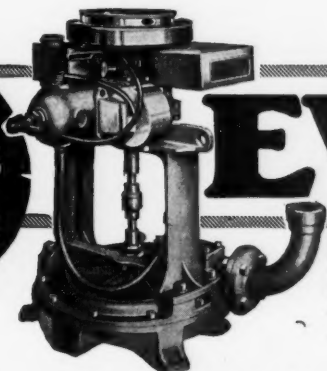
sewer contractors for work in close quarters, public service and traction companies for underground work. Ideal priming outfit for sand dredge pumps. Drains out the holds of barges and freighters.

The Evinrude is light, compact, handy — weighs only 115 pounds complete — easily moved by two men. Power is supplied by a 2 H.P. Evinrude gasoline engine, the same as now used in more than 150,000 Evinrude rowboat motors.

Dealers: This is the biggest season for pump sales. Write or wire for proposition — now. Some desirable territory still open.

EVINRUDE MOTOR COMPANY
52 Lake Street Milwaukee, Wis.

**5000
GALLONS
per hour
at 20 ft. head**



EVINRUDE
CENTRIFUGAL PUMP

For users requiring a more powerful pump the Evinrude No. 1½ is recommended. 7400 gallons per hour at a 20-ft. head — 3½ h.p. Evinrude motor. Price \$175.

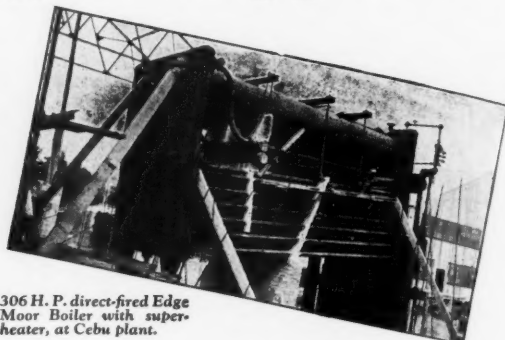
Price:
\$150⁰⁰
F.O.B. MILWAUKEE

When writing advertisers please mention **ROCK PRODUCTS**

Even in the far-off Philippines—



National Cement Co.'s
805 H. P. Edge Moor
Waste Heat Unit.



306 H. P. direct-fired Edge
Moor Boiler with super-
heater, at Cebu plant.

Waste Heat is Converted into Useful Power by Edge Moor Boilers

THE value of the Edge Moor system for conserving waste heat is recognized by the National Cement Company of Cebu, Philippine Islands, whose new plant is equipped with an Edge Moor Waste Heat Unit of 805 H. P.

This 1200-barrel mill, built by the National Development Co. under the auspices of the Philippine Government, has also installed a 306 H. P. direct-fired Edge Moor Water Tube Boiler with stoker and superheater, for standby service.

In cement plants situated far from the sources of fuel supply, the great economy of the Edge Moor Waste Heat System is especially apparent.

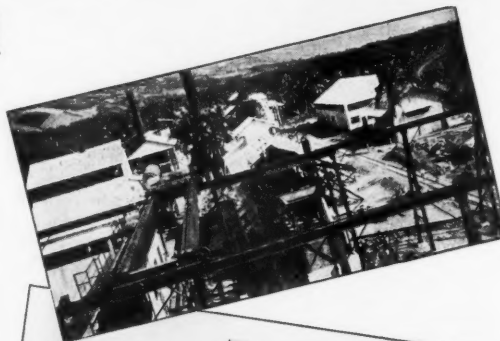
Each installation is made with a definite guarantee of results. Details will be sent promptly at your request.

EDGE MOOR IRON COMPANY

Established 1868

EDGE MOOR, DELAWARE

New York Chicago St. Paul Boston Pittsburgh Charlotte



These three photographs
give an idea of the sur-
roundings of this cement
mill in the Philippines.



EDGE MOOR Water Tube BOILERS



FOR INCREASED FUEL ECONOMY

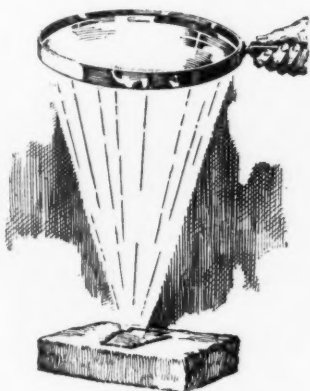
When writing advertisers please mention ROCK PRODUCTS

High Heat Resisting— High Lubricating and Friction Reducing Value



A section of the Kiln Room, taken from the extreme hot end of the Kilns and showing the first line of bearings

IN KEYSTONE-KEYSO Greases we are offering a formula which is a remarkable step forward in the development of efficient lubrication of machinery operating under high heat conditions. They combine all the necessary heat resisting properties with a high lubricating value and efficiency. Their use under the severest working conditions of heat have not resulted in decomposition or waste, but, on the contrary, the grease has held in bearings where other lubricants have given little or no satisfaction.



Send for Booklet describing *Keystone-Keyso High Melting Point Greases*.

Keystone-Keyso *High Melting Point Grease*

has been developed after considerable laboratory and practical service research work, and is now in use in many representative American industries giving more economical and efficient service.

Keystone-Keyso Grease is manufactured in seven densities, from light cup grease to heavy brick form, but it is emphasized that the melting points of the various densities are practically identical. The selection of one in preference to another should be based only on mechanical conditions to meet preferable and necessary methods of application, without regard to conditions of varying heat.

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GREASE

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Webster Continuous Bucket Elevators

are used primarily for handling sand, gravel, stone, lime, etc.

They are built in many different lengths and capacities to suit the requirements of the individual plants.

They are built of either steel or timber construction with malleable iron or steel buckets mounted on single or double strand of chain or on elevator belts.

Allow our engineers to help you in the proper selection of equipment.

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When writing advertisers please mention ROCK PRODUCTS

Here Are Typical Examples of Sand and Gravel Operations Carried On at Low Cost by Using **SAUERMAN EXCAVATORS**



This pit, 400 ft. long and 30 ft. deep, shows what a Sauerman Cableway can do in one season



An economical feature of Cableway is that it lifts material to top of plant



A Sauerman Cableway bucket will fill like this in 10 seconds



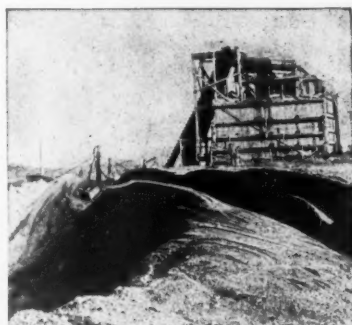
One man runs this Sauerman Cableway, feeding 800 tons per day to the screening plant



Cemented gravel handled without difficulty by a Sauerman Power Scraper



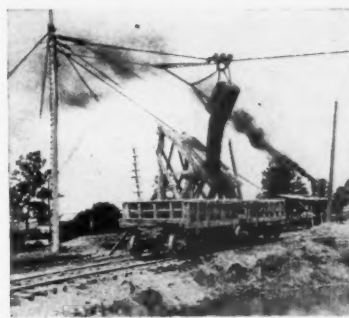
Sauerman "Crescent" Scraper strips overburden and drags spoil into old pit



Sauerman "LeClair" Scraper gets big results in gravel bank



Digging gravel from bar in river with 800-ft. span Sauerman Cableway



Ballast is dug and delivered direct to cars with a cableway

Why not write us about *your* problem now?

If the illustrations here do not give you sufficient evidence of the adaptability of Sauerman equipment for your conditions and requirements, submit your problem to Sauerman engineers. Their experience, gained through contact with over 1000 installations of Sauerman cableways and

power scrapers, is freely at your service. Tell us what you want to accomplish, daily yardage you require and the surrounding conditions and we will suggest the type of equipment and general layout that will give you the desired result at lowest cost.

SAUERMAN BROS., 430 S. Clinton St., Chicago

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KOEHRING

CRANE EXCAVATOR

"HEAVY DUTY"

SINGLE LEVER STEERING

KOEHRING Cranes are as easy steering as motor trucks. One single lever with four operating positions turns crane to right or left or propels it forward or backward. High and low speed. The unusual easily controlled traction ability of the KOEHRING on any ground without planking is a worth while saving of time and profit—interchangeable for dragline or power shovel.

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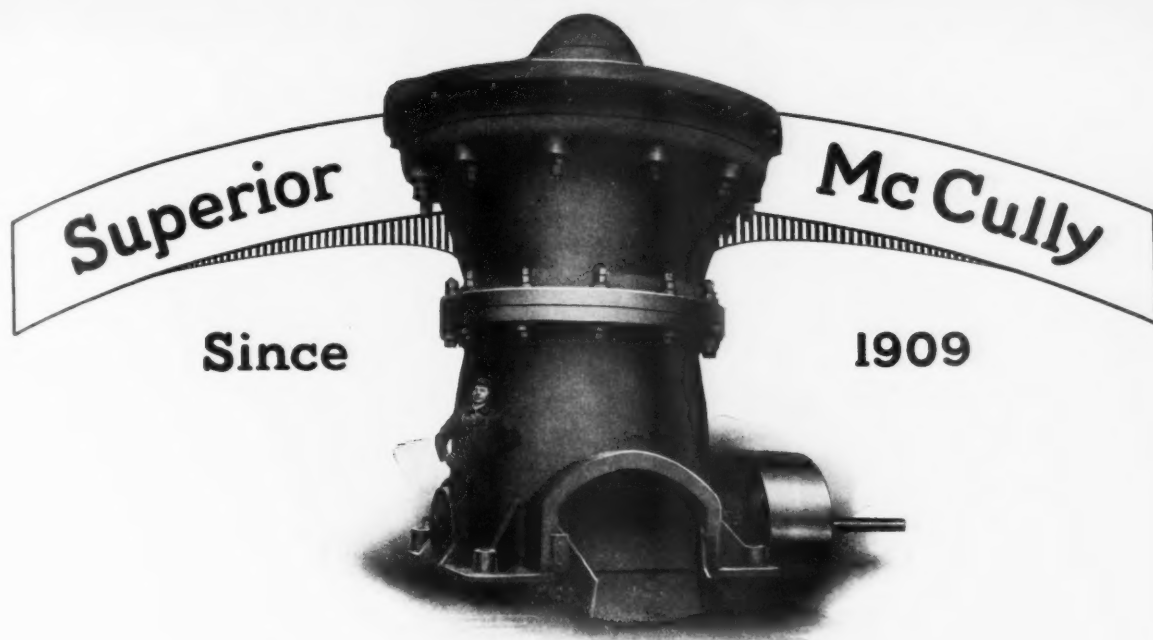
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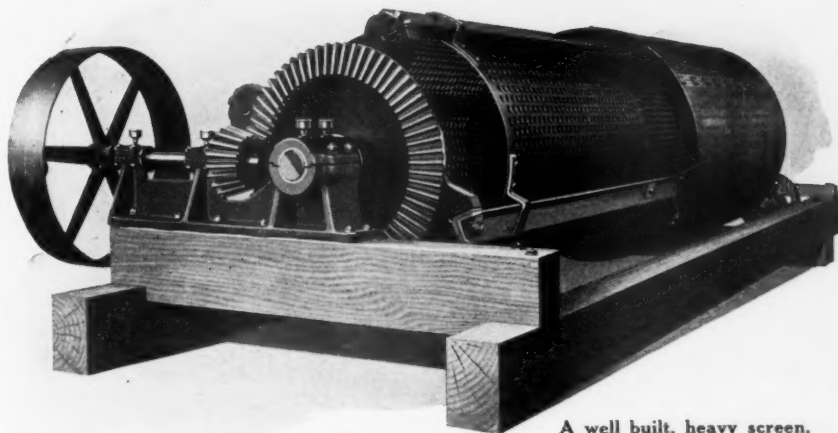
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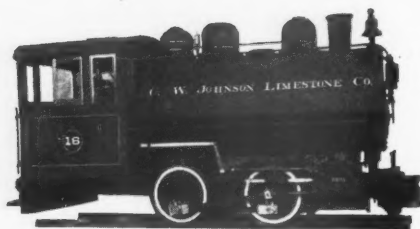
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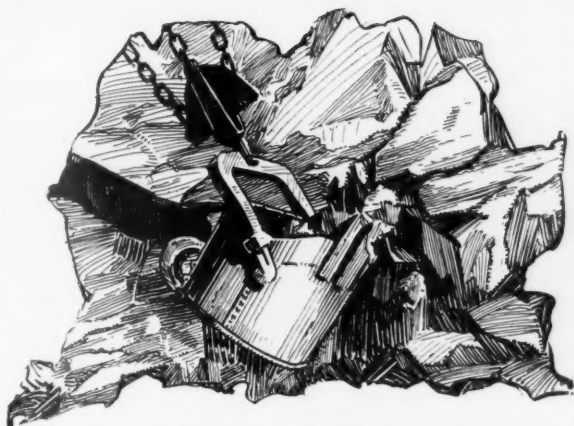


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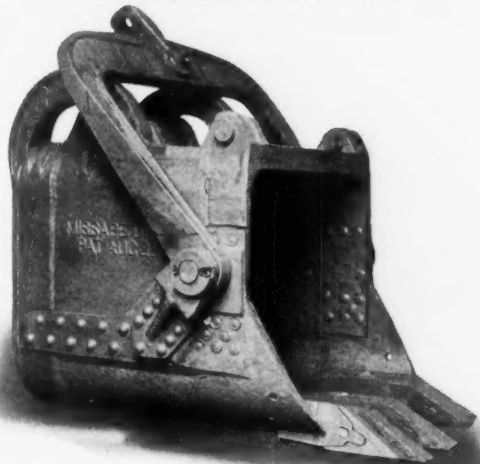
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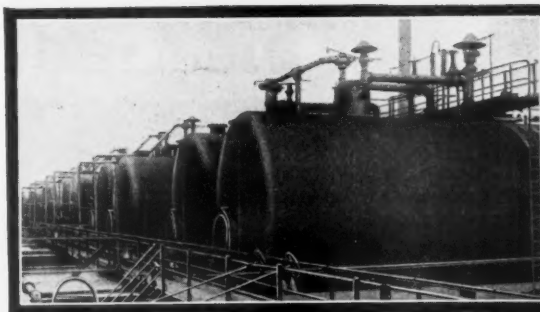
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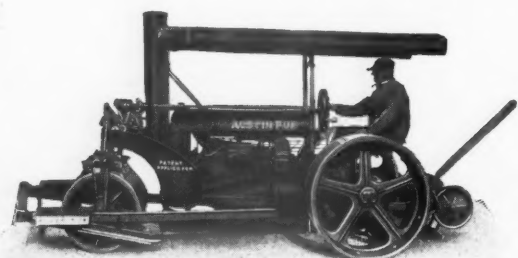
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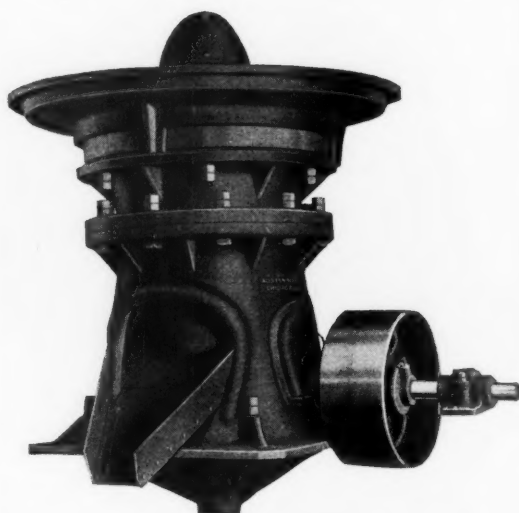
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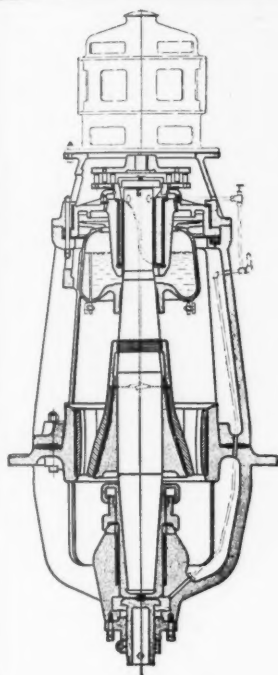
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Construction is all steel with Chrome-Vanadium Molybdenum forged steel shaft. Built in six standard sizes—largest size takes 12 in. rock rejecting 350-450 tons per hour. Smallest machine when set to 1 3/4 in. rejects 120 tons per hour, or 40 tons per hour with 1/2 in. setting. Arranged for both motor and belt drive.

Send for Bulletin 25 Which Describes This Machine in Detail

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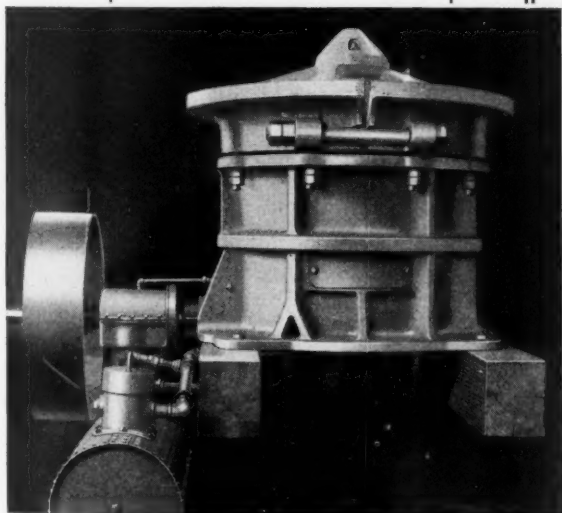
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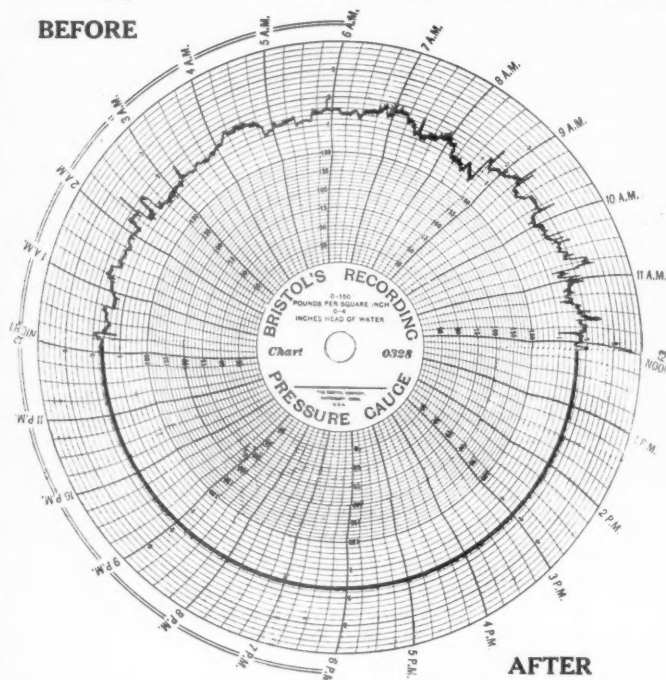
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Producer gas cannot be burned efficiently and economically in any furnace when the gas main pressure is irregular as shown by upper half of chart.

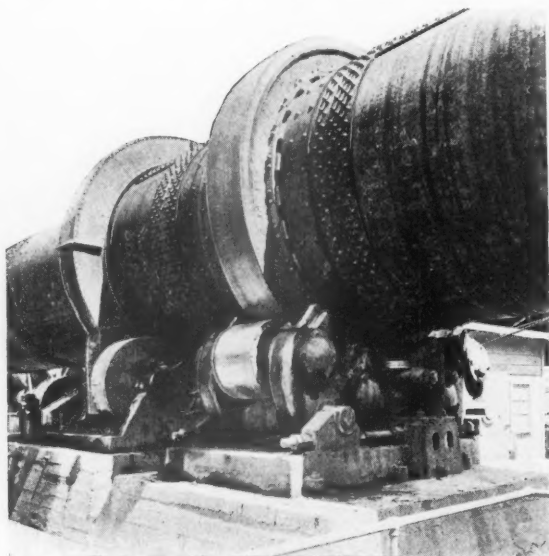
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The installation is the Western States Portland Cement Company, Independence, Kansas. They operate four 9'x0"x175'0" two-tire Vulcan Rotary Kilns.

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We will be pleased to go into further details of Vulcan Rotary Kiln construction; also to have our engineers work with you in your individual problems relating to kilns.

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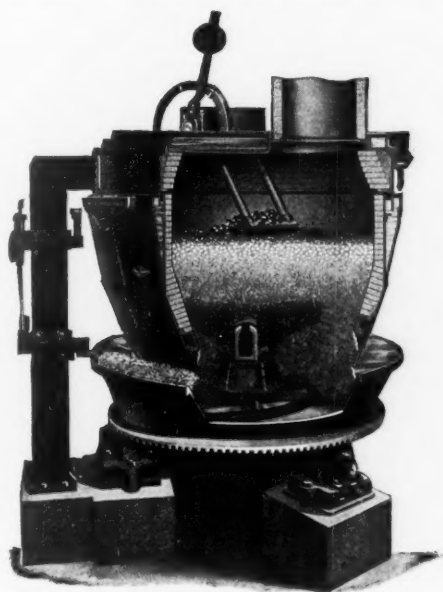
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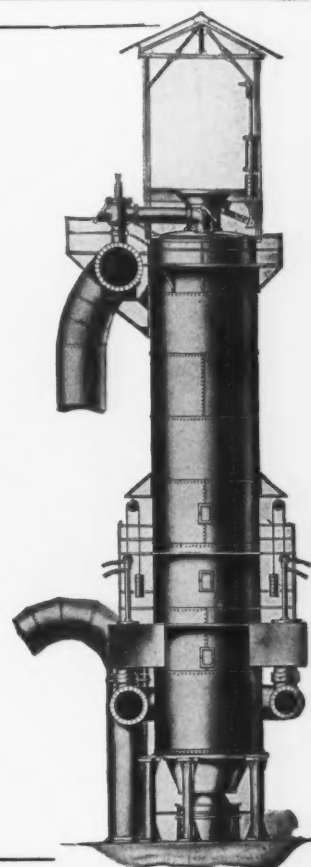
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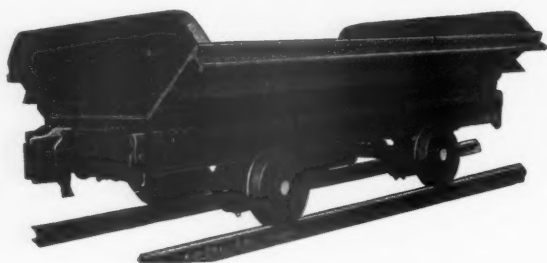
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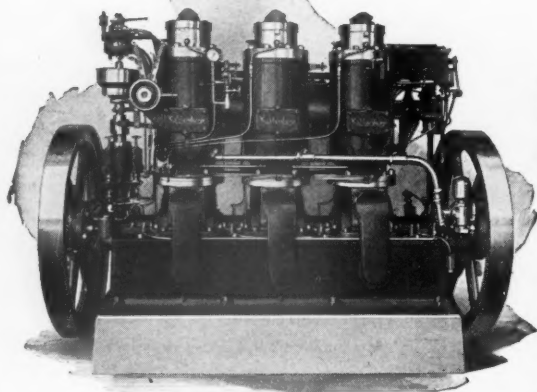
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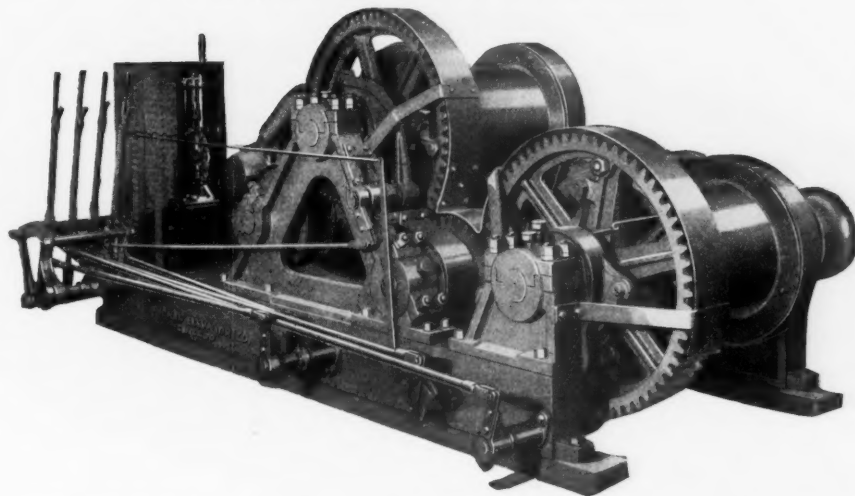
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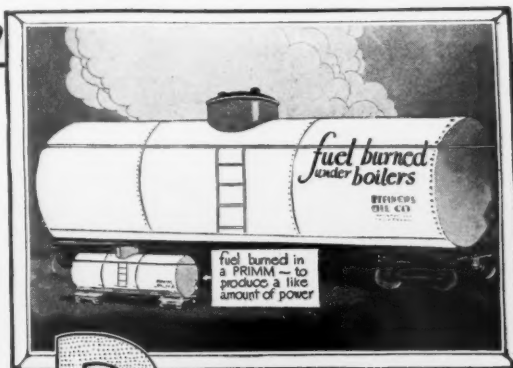
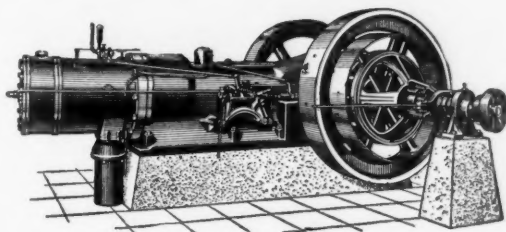
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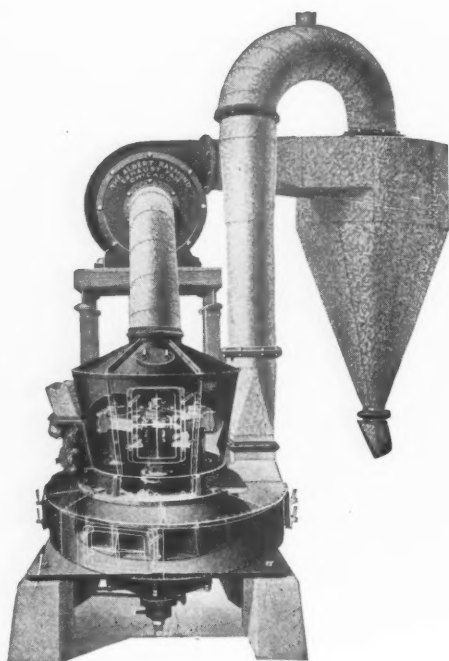
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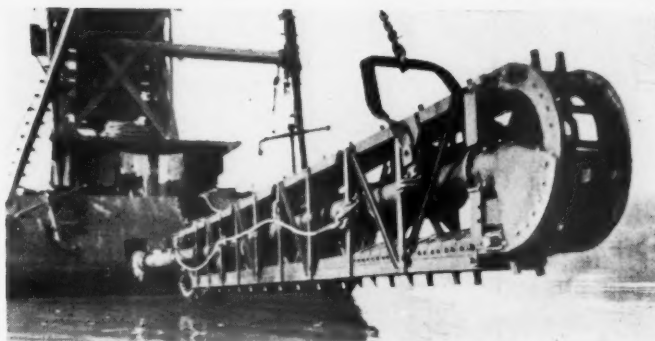
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**For Handling the Materials
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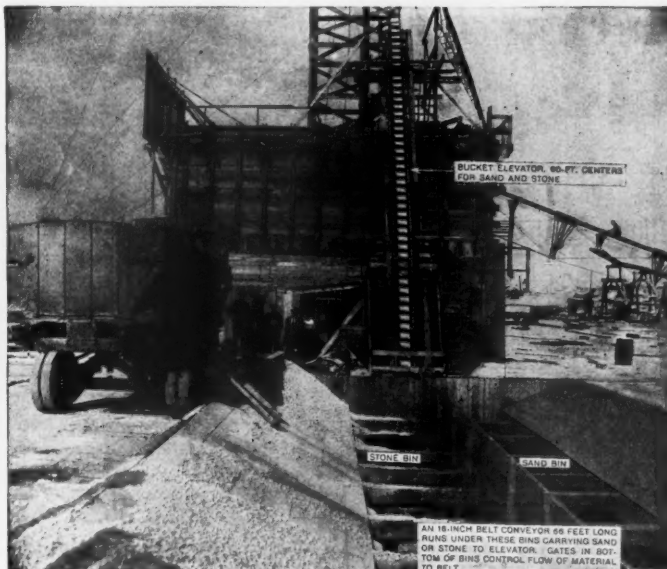
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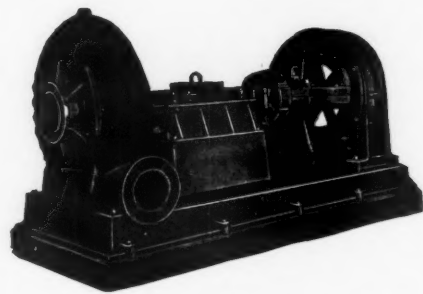
Armstrong Patent Wire Line Derrick Reduces Cable Costs 75 Per Cent

ONE of the great outstanding features of the ARMSTRONG "ALL-STEEL" BLAST HOLE DRILL is the Patent Wire Line Derrick, which fully absorbs the shock of the drilling motion, and permits the exclusive use of wire line in blast hole drill operations. By eliminating the use of manila cable, the greatest maintenance expense item in the operation of a blast hole drill is reduced to a minimum. It is a big exclusive patented feature found only on the Armstrong machine.

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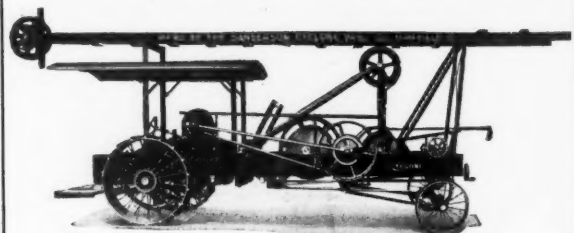
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A Drill for Plants of Limited Production

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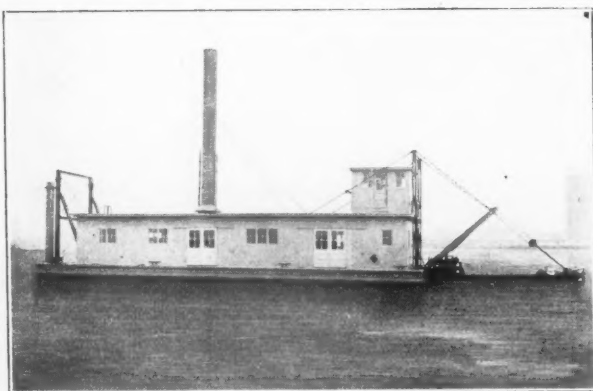
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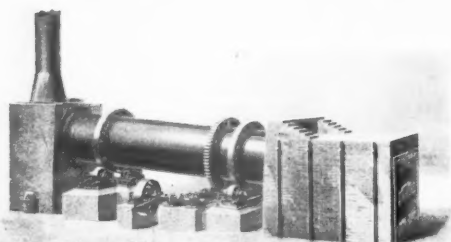
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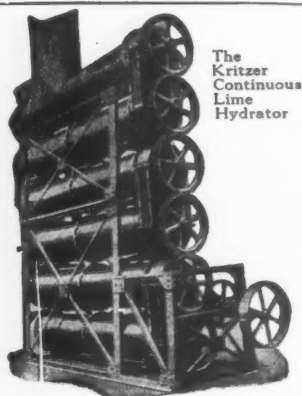
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 Continuous
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Years ago we helped our customers create a demand for their hydrate. Today the demand exceeds the supply. That's why every lime manufacturer should have an efficient, economical hydrating plant.

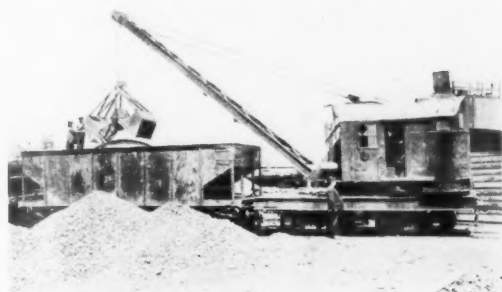
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A KRITZER plant, scientifically adapted to your conditions, will give you the best product at lowest cost

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¾ and 1 cu. yd. Revolving Types
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ERIE Steam-Shovel
owned by Jackson-
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"During the past year we have moved approximately 50,000 cu. yds. of slate shale with our ERIE Shovel. It is a wonderful machine, ideal for our work, as it is easily moved. We find it very economical and inexpensive. We are very much pleased with our investment." N. M. Male, Sec'y, JACKSON-BANGOR SLATE CO., Pen Argyl, Pa.

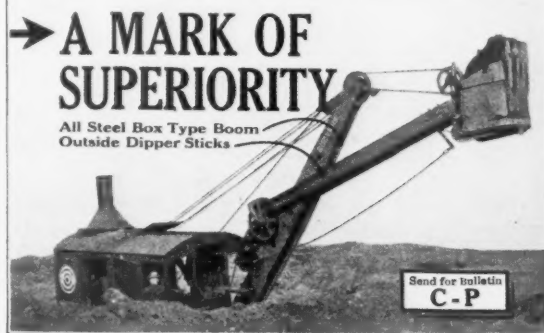


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The ERIE Shovel is easy to operate, and very speedy. It is built with extra strength all the way through, and gives steady service in hard rock loading. Let us send you full details about the ERIE Shovel, and what it will do. Write for a copy of Bulletin P.

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Builders of Erie Steam Shovels and Locomotive Cranes

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This type of boom is lighter and stronger. It is much better adapted to carry the heavy wrenching and twisting stresses of digging. Its greater lightness adds to the ease and speed of swinging.

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We Know Because We Have Built Hundreds of Both Types.

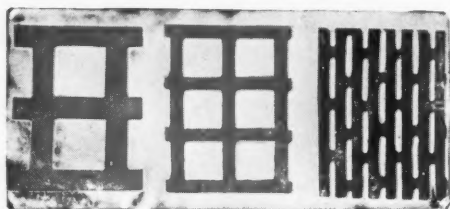
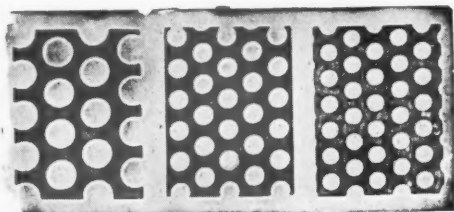
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BUCYRUS

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meshes—from 2" space
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It can be delivered carefully graded to size.

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Jaw Crushers—Jaw Plates, Cheek Plates, Toggles and Toggle Bearings.

All sizes of Standard Detachable Chain, Sprocket Wheels and Elevator Buckets.

**THE HADFIELD-PENFIELD
STEEL COMPANY**

Bucyrus, Ohio

Webb City & Carterville Foundry & Machine Works

Webb City, Missouri

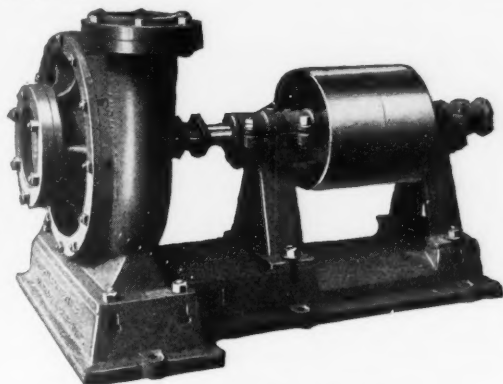
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Complete Crushing Plants Designed

Manufacturers of rock crushing machinery: Jaw Crushers, Hercules-Giant and Heavy Duty Crushing Rolls, Screens, Centrifugal Pumps, Elevators, Stone Buckets, Sheet Metal Work, Stone Cars.



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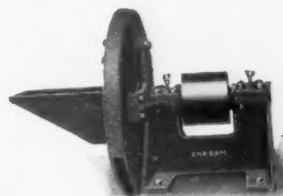
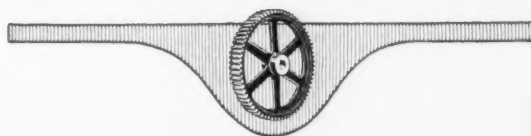
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SMOOTH running; correct in design, accurate and true to pitch, Caldwell gears are bound to please you. We make all types—machine-molded, cut tooth, mortise gears, worm gears, etc. Learn more about Caldwell-Link-Belt Service.

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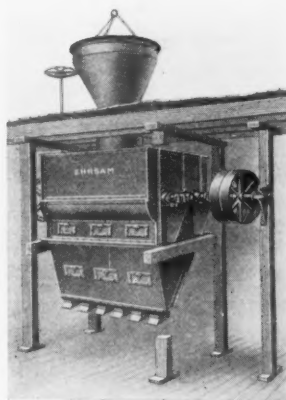
H. W. CALDWELL & SON CO. LINK-BELT COMPANY, OWNER
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Hair Picker

EHRSAM Machinery



Double Barrel Mixer with
Sacking Hopper

Ehrsam Hair Pickers are a necessary equipment for wall plaster plants. They are perfect in design and construction, being the recognized standard for this type of machine.

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Like all Ehrsam products they are built to stand up and give an uninterrupted service performance.

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Enterprise, Kansas

John J. Abramson, Western Sales Representative
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Thirty Two Years Ago

The First Champion Crusher Was Built

Since that time more than 6,000 crushers have been sold and users are to be found in every country in the world. The Champion is a slow speed, steel frame crusher, with a large capacity and low upkeep cost. Made in many sizes from 50 to 1000 tons' daily capacities.



No. 20 (22 by 50) Champion Steel Rock Crusher

We design, build and install complete crushing outfits of any size desired. We specialize in the building of Elevators, Screens, and Conveyors of any desired capacity.

Ask for catalogue, "Champion Crushing and Quarrying Machinery." It is free.

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Doing Good Work

"We have used the American Pulverizer for about five years and it has done good work in hard limestone, reducing it to $\frac{1}{4}$ in. to dust, in one operation."

(Signed) Tarbox and McCall,
H. McCall.

Some of the good things you can always be sure of is the reliability, economy and freedom from trouble that follows an installation of an

AMERICAN Ring Pulverizer

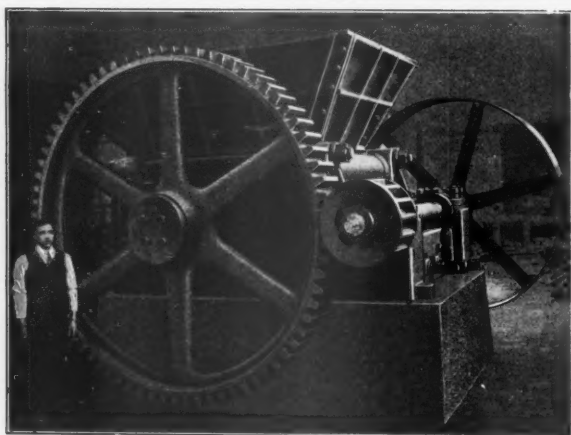
It delivers the uninterrupted service you expect and pay for. It does the work for which it was designed, faithfully and well, increasing efficiency of your plant at a low cost.

American Pulverizer Company

General Office and Factory:

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If you had seen the McLanahan Single Roll Crusher before ordering your first Gyratory or Jaw Crusher, you would now be running only the McLanahan Crushers.

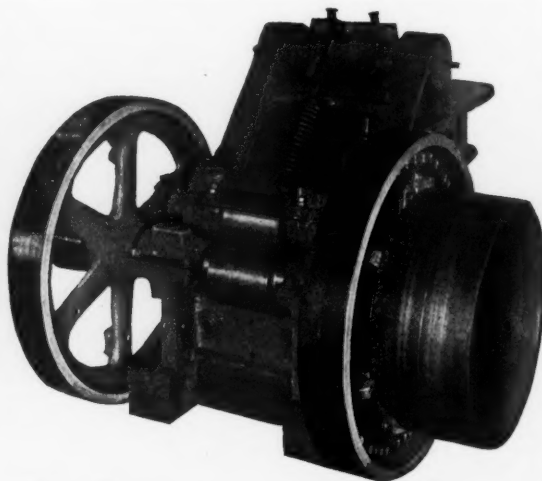
After many years' practical experience building and operating other crushers, we brought out the first Single Roll Crusher, proved it best, simplest and most economical—making least fines—requires but little head room—no apron or hand feeding—takes wet or slimy material.

Capacity, 5 to 500 Tons Per Hour

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IN ALL SIZES FOR EITHER PORTABLE PLANTS FOR ROAD BUILDING OR STATIONARY QUARRY INSTALLATIONS.

BUILT FOR LONG, HARD SERVICE—WILL SAVE YOU MONEY IN THE LONG RUN

Let us quote you prices

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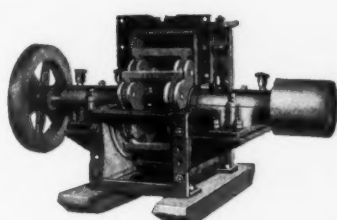
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USERS OF

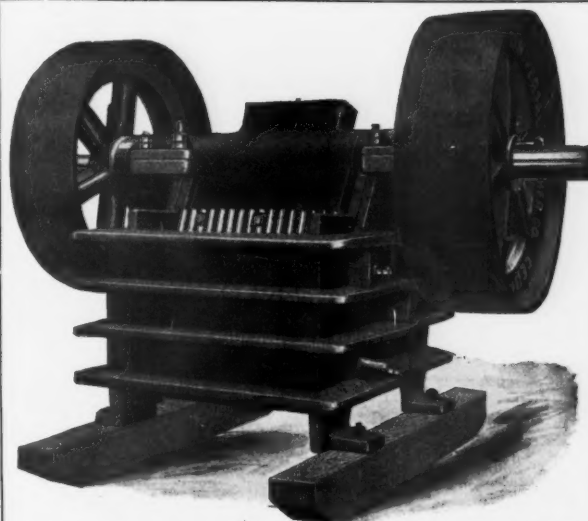
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requiring additional
tonnage are order-
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May we tell you why?



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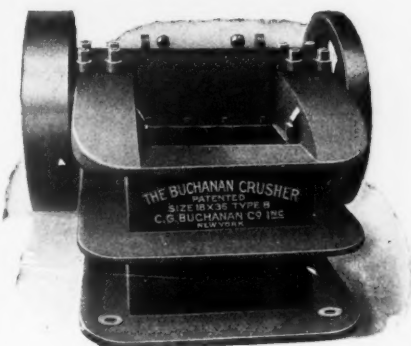
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CRUSHER

Sizes up to 8"x36". Capacities 20 to 200 tons
daily. Crushes to 3/4" and finer if desired. Has
no superior for FINE CRUSHING and UNI-
FORMITY of product.

STRONG LIGHT DURABLE ECONOMICAL

UNIVERSAL CRUSHER CO.

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BUCHANAN ALL-STEEL CRUSHER

Type "B" Jaw Crusher

Frame is a solid casting of open-hearth steel in one piece having a tensile strength of 60,000 to 65,000 lb. per square inch, three or four times stronger than cast iron and with at least three or four times the rigidity of the built-up rolled steel-plate crusher.

Jaw and Cheek Plates are of the best Manganese Steel, made reversible for double wear—Adjustable Jaw Stroke—Shim Adjustment—Safety Toggle—Reversible Steel Toggle Seats—Phosphor Bronze Frame Bearings (in smaller sizes)—Steel Swing Jaw and Pitman—Pitman water jacketed and parting in larger sizes.

Built in sizes up to 18" x 36".

Large Crushers, Crushing Rolls, Complete Crushing Plants
Write for Bulletin No. 9

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Cedar and West Streets, New York City

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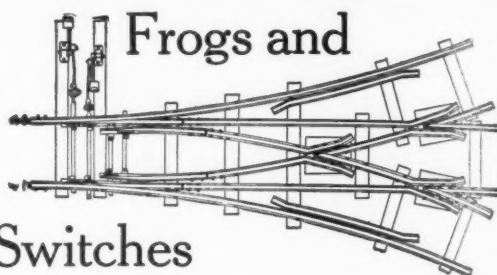
ROBERT W. HUNT & CO.**Inspection—Tests—Consultation**

Inspection New and Second Hand Machinery, Pumps, Crushers, Steam Shovels, Cars, Locomotives, Rails and Quarry and Contractors' Equipment

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Frogs, Switches, Crossings, Switch Stands, Rails, Angle Bars, Fish Plates, Throws, Rail Braces, Tie Plates, Portable Track, Etc., Etc.

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CEMENT MANUFACTURING PLANTS
 CEMENT MAKING MACHINERY
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 FLINT PEBBLES—SILEX LINING
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Electric Motors and Generators
for all requirements of the Rock Products Industry**BURKE ELECTRIC CO.**

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This organization designs and builds Lime and Hydrated Lime, Cement and Plaster plants after making a scientific study of each proposition.

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Type 31, 6-ft HUM-MER

HUM-MER Electric SCREEN

Makes screening and crushing more profitable. Screens any material, wet or dry, from 2 1/2" opening to minus 200 mesh.

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THE W. S. TYLER COMPANY
 CLEVELAND, OHIO
 Manufacturers of Woven Wire Screens and Screening Equipment

**BACON~FARREL
 ORE & ROCK
 CRUSHING~WORLD KNOWN
 ROLLS~CRUSHERS**

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When in the market for machinery or equipment, look through the advertisements of ROCK PRODUCTS. If you do not find what you want advertised in this issue, write us and we will put you in touch with reliable firms who can supply your need. This service is free to our readers. Use it.

Rock Products

*The Nation's Business Magazine of the
 Rock Products Industry*

542 So. Dearborn St. Chicago, Illinois

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TruckCrane

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The Byers "Truckcrane" can be driven to work just like any automobile. Saves time and expense on every job. One owner recently refused \$50.00 rental per day for a two weeks job in Chicago. Ask for "Truckcrane" Bulletin.

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Builders of Full Circle Cranes, "Auto-Cranes," Buckets, Hoists, etc.

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Industrial and Contractors' LOCOMOTIVES

are in use where dependable motive power is required.

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Industrial Cars and Dumping Buckets of All Kinds



Specialize in

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Crushing Rolls.
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Fuller-Kinyon System for Conveying Pulverized Materials.
Sprockets, Traction Wheels, and Roll Heads.
All kinds of High Grade Chilled Charcoal Iron Castings for All Uses.

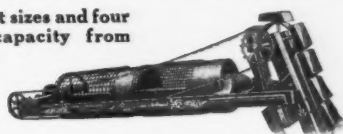
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Fullerton, Pa., U. S. A.

New Holland Revolving Screens

made in three different sizes and four different lengths — capacity from one to two hundred tons per hour.



Write for catalog and prices on revolving screens, jolt screens, elevators, conveyors, and primary or secondary rock crushers.

NEW HOLLAND MACHINE COMPANY

New Holland, Pa., U. S. A.

"CARROLL" SOLID WELD

DEPENDABLE · ECONOMICAL ·

Will Surely Reduce Operating Costs

**THE CARROLL CHAIN COMPANY
COLUMBUS, OHIO**

STEAM SHOVEL CHAIN

S. O. S.

Many a ship has been sunk by ignoring small leaks. Your haulage problem, if a source of waste, may lead to disaster.

Investigate the possibility of effecting a saving by installing an

**Automatic
Aerial Tramway**

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FOR SALE

- | | |
|--|------------------------|
| 2—8x110' Rotary Kilns. | 3—5½x22' Tube Mills. |
| 5—5x6x7x110' Rotary Kilns. | 2—6x50' Rotary Dryers. |
| 5—5x21' Tube Mills (1 has
Silax lining, 3 steel lining,
1 without lining). | 3—Kominuters. |
| 1—4' 6"x29' Coal Dryer. | 6—Krupp Ball Mills. |
| 2—No. 6 Gates Crushers. | 3—33" Fuller Mills. |
| | 2—6x60' Rotary Dryers. |

ENGINEERING SALES COMPANY, Nashville, Tenn.
OLLIE LAWRENCE, Stockertown, Pa.

Released Stone Crushing Equipment

No. 7½ K Allis Chalmers Gyratory Crusher. Straight Drive Shop No. 5367. Some \$2000 worth of extra parts, including head and shaft, eccentric and gear, bushings, etc. All in good working order. Can ship immediately.

No. 4 Austin Gyratory Crusher. Straight drive. Extra eccentric, gear and other parts. Smooth head for fine crushing.

General Electric D. C. Generator. 2500 watts, 125 volts, belt drive. Suitable for lighting plant or driving small shop motor.

Cletrac Caterpillar Tractor. Shop No. 23644. Only used three months, but needs some repairs. Will sell at a bargain price.

Several small Steam Piston Pumps.
Some 6 H.P. to 10 H.P. Gasoline Engines.

A 10-ton Road Roller.

LEHIGH STONE COMPANY
Box 515 Kankakee, Illinois

CRUSHER PLANT

24x36 Buchanan Jaw Crusher, and 48 in. Symons Disc Crusher, with elevators, screens, line shafting. In Oklahoma.

Dump Cars

- 9—1 yd. 30 in. Ga. V-shape
6—1½ yd. 24 in. Ga. Western
12—4 yd. 36 in. Ga. Western

Rails

- 230 tons 25 lb. Relayers
180 tons 30 lb. Relayers
165 tons 35 lb. Relayers
Also 60, 70, 75 and 80 lb. Rails

**Mid-Continent Equipment &
Machinery Company**
Security Bldg. St. Louis, Mo.

WANTED

Three (3) Raymond Mills

Address Box 1637, care of Rock Products
542 South Dearborn St., Chicago, Illinois

WANTED

Air separator 18', prefer Gayco. Advise present condition, location, price, etc. Also one belt or chain elevator, 75 to 80 ft. centers, with about not less than 7 x 14 buckets complete. Address

Box 1631, Care of Rock Products
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Cement Mill Machinery For Sale

1—New 6' diameter x 22' long Bonnot Tube Mill, complete without drive pulley and with or without liners. Machine has water cooled bearing and is belt driven. Location—Bettsville, Ohio.

1—Used 6' diameter x 22' long Bonnot Tube Mill, complete with drive pulley, liners, pebbles, etc. In first-class condition. Location—Bainbridge, Pa.

1—Used 8' diameter x 6' long Kennedy Van Saun Ball Mill complete with drive pulley, liners, balls, etc. In good condition. Location—Bettsville, Ohio.

1—Used 8' diameter x 22' long dry grinding Kennedy Van Saun Combination Mill, complete with pulley, liners, balls, etc. In first-class condition. Location—Bettsville, Ohio.

1—Used 8' diameter x 6' long Allis-Chalmers Ball Mill, complete with pulley, liners, etc. In first-class condition. Location—Bainbridge, Pa.

1—Used 8' diameter x 6' long Kennedy Van Saun Ball Mill, complete with pulley, liners, etc., but without discharge head. In fair condition but requiring a new head. Location—Bainbridge, Pa.

A large stock of repair parts for all mills.
34 new unpunched tank steel plates, 280"x96"x 9/16" thick. Total weight 154,424 lbs. Just sufficient to roll two 7x110' Rotary Kilns, including butt straps.

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Tiffin, Ohio

Wanted—Used Equipment

Two 6' 2 or 3-surface. Hummer Vibrator Screens, with or without screw feed. Might consider mechanical vibrator.

1 Horizontal tubular boiler complete with trimmings without stack. 80 b. h. p. Pressure 100 lbs. inch.

1 Steam Shovel, ½ cu. yd. full revolving, half or full caterpillar, possibly consider 1 steam or gasoline power crane with ½ to ¾ clamshell bucket same traction.

Eau Claire Sand & Gravel Co.
Eau Claire, Wis.

Private Equipment

- Sunbury Unloader, complete
2 Oshkosh 2½ ton trucks, dump bodies
Sturdevant balanced roll, 20x14
Sturdevant ring roll mill, No. 1
1½ yd. clamshell bucket
20 all steel 12 yd. standard gauge dump cars
2 gasoline locomotives, 24-in. gauge
2 gas locomotives, 36-in. gauge
Vulcan saddle tank locomotive, 24-in. gauge
2 saddle tank locomotives, 36-in. gauge
10 ton Holt caterpillar tractor
3 Port Huron trailers, all steel
20 Koppel V-shape all steel 1½ yd. dump cars
1 yd. orange peel bucket
1 Pioneer cableway bucket, ½ yd.
Keystone Excavator No. 3
Byers Auto Crane with clamshell bucket
Thew ¾ yd. steam shovel, traction
Kennedy hammer crusher, type C
Symons disc crusher, 24 in.
Gallon Unloader
40 ton Climax geared locomotive
30 box cars, 80,000
Portable boiler
Austin paver, caterpillar, 2 bag.

D. B. Straley Crown Point, Ind.

Have you a plant for sale? Do you wish to purchase a plant? Are you in need of a superintendent or manager? Are you looking for a position as plant superintendent or manager? Advertise your wants in these columns for quick results.

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FOR SALE

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Complete with 100 h.p. G. E. motor; starter, rails and pulley with belt and extra parts.

Plant in operation less than 30 days

Price, \$4,000, f. o. b. Porterville, Calif.

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IMMEDIATE SHIPMENT

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2—Bonnot 5'x22' Compeb (tube) Mills.

1—Vulcan 8'x100' Rotary Kiln.

1—Vulcan 7'x120' Rotary Kiln.

1—Renneberg 5½'x45' Ore Dryer.

4—American Process 4'x30' Rotary Dryers.

2—Hardinge 8' Conical Mills.

1—Link Belt 20-Ton Hourly Coal Crusher.

Raymond, Kent and Fuller Mills.

Swing Hammer Mills, all makes.

Buchanan and Sturtevant Crushing Rolls.

Jaw, Gyratory and Disc Crushers. Complete Experimental Cement Plant.

High Grade Used Machinery for the Entire Rock Products and Non-Metallic Mineral Industry Our Specialty

American Machinery Equipment Co., P. O. Box No. 292, Charlotte, N. C.

The Equipment Sales Company announce the opening of offices in the Independent Life Building, Nashville, Tenn., and offer for sale:

1—No. 2 Sturtevant Duplex Mill, good operating condition.

1—5x22 ft. New Tube Mill, steel lined.

1—5x9 ft. New Tube Mill, steel lined.

Wire your requirements at our expense
"If we don't have it we will get it"

THE EQUIPMENT SALES COMPANY

Independent Life Building

Nashville, Tennessee

DREDGE FOR SALE

Fully equipped steam suction dredge ready for immediate service.

8-in. Morris direct connected pump.

Dull inclined conical screens.

Separate sand sluice so that straight sand can be pumped without elevating to sand and gravel separating rig.

Hull built of full length Oregon fir.

H. H. Halliday Sand Co.
Cairo, Ill.

FOR SALE

One W. S. Tyler Co. Hummer Electric Screen with four sets wire in frames and suitable for sand screening. This machine is practically new, used but one month. For particulars address

Box 1635, care of Rock Products
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RAILROAD SHOVELS

Bucyrus steam shovel, standard gauge, 65 ton, 2½ yd. dipper, \$3500. On track, Negaunee, Mich. Immediate shipment.
Thew steam shovel, standard gauge, 1¼ yd. dipper, \$2500. Indiana delivery. Cash or terms.

Lock Box 205

Crown Point, Ind.

WANTED

Direct fired drier about 6x60.

Traveling Grizzly about 48" wide and 6 or 8' long.

100' of belt conveyor equipment.

Address Box 611

Tulsa

Oklahoma

FOR SALE

1 No. 8B Gates Gyratory Crusher, \$2500

1 No. 6K Gates Gyratory Crusher, \$2500

1 No. 4B Gates Gyratory Crusher, \$600

1 No. 3B Gates Gyratory Crusher, \$400

Box 1644, care of Rock Products

542 South Dearborn St., Chicago, Illinois

For Sale—STEAM SHOVEL

¾ YD. THEW "O" TRACTION

Thoroughly rebuilt; attractive terms for quick sale.

Walter A. Zelnicker Supply Co., St. Louis
Rails, Locomotives, Cars, Tanks, Pipe

FOR SALE

BARGAIN

Emerson, Brantingham Hoists
UNUSED

DOUBLE CYLINDER, SINGLE
DRUM, IN FIRST-CLASS
CONDITION

\$150.00 Each F.O.B. Chicago

Capacity 10,000 Pounds
IMMEDIATE SHIPMENT

Detailed Specifications Furnished
on Application

"QUANTITY IS LIMITED"

Hyman-Michaels Co.

531 Peoples Gas Bldg., Chicago, Ill.

Machinery For Sale

DRYERS—Direct-heat rotary dryers, 3x25', 3½ x25', 4x30', 5½x50', 6x60' and 7x60'; double shell dryers, 4x20', 5x30' and 6x35'; steam-heated air rotary dryers, 4x30' and 6x30'.

KILNS—Rotary kilns, 4x40', 5x50' and 6x70', 6x100', 7x80' and 8x110'.

MILLS—6x8', 6x5', 5x4', 3x3½' pebble and ball mills; 3' March mill; 42", 33" and 24" Fuller-Lehigh mills; 4½x20', 5x11', 5x20', 5½x22' and 6x20' tube mills; 7½x13", 9x15", 16x10" and 12x26" jaw crushers; one "Infant" No. 00, No. 0, No. 2, No. 3, and No. 9 Williams' swing hammer mills; one Kent type "G" mill; 24", 36" and 40" cage mills; 3' and 4½', 6' and 8' Hardinge mills; 18x12", 20x12" and 30x10" roll crushers; No. 0, No. 1 and No. 3 Sturtevant rotary crushers; one No. 2 Sturtevant ring roll crusher; 5 roll and 2 roll No. 1 and No. 000, No. 00 and No. 0 Raymond mills; one No. 3 and No. 4 and No. 7½ Tel-smith breaker; one 36" Sturtevant emery mill; one 3 roll Griffin mill; 60" chaser mill.

SPECIALS—Five automatic package weighing machines; jigs, 6x8', 6x5' and 4x3' Newaygo vibrating screens; Richardson automatic scales; 8' and 10' Emerick air separators.

Air compressors.

W. P. Heineken, Engineer

95 Liberty Street, New York. Tel. Cortland 1841

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FOR SALE

2 No. 2 Climax 9"x16" Jaw Crushers complete.
75 H.P. 13"x16" side crank Erie City Steam Engine.
9"x14" Vulcan Locomotive No. 981 complete.
2 G.E. 150 H.P. Induction Motors, voltage 220-440, shop numbers 625140 and 1164925—complete with starters.
Williams No. 9 Universal type swing hammer pulverizer complete.
Kent three-roller pulverizer.
10"x8"x20" Worthington St'm Pump No. 16876.
Sanderson Cyclone No. 14 well drill, either electric or gasoline driven, complete.
Austin Standard Revolving Screen 40" diam. by 20' long, complete.
Williams No. 2 Pulverizer.
No. 1 Sturtevant Open Door Crusher.

E. W. COOPER, Engineer
174 3rd Ave. North Nashville, Tenn.

Quarry Cars For Sale

15-End Dump Standard Gauge Steel Quarry Cars in first class condition. New, 1922. 4½ to 5 ton capacity.
Will sell at exceedingly low price to move quickly

INLAND CRUSHED STONE CO.
139 North Clark Street Chicago, Illinois

Special Bargains

Send Us Your Boiler Inquiries

66x86 in. TRAYLOR JAW CRUSHER
25-50-80-110 H.P. Elec. Hoists
Nos. 4-5-6-7 ½-9 and 10 CRUSHERS
6 and 12-ton Gasoline Locomotives
2-DISC CRUSHERS, 36-in. SYMONS
100-TON, 2 ½-YD. ELECTRIC SHOVEL
50-5000 ft. Steam Belt and Electric Compressors
13x30 in. 10x18 in. 8x14 in. JAW CRUSHERS
24x54 McLANAHAN ROLL CRUSHER
50 H.P. P. D. D. HOIST, 440-v. 3-ph. Motor-Drag-line Set; also 25 H.P. Outfit
NEW G. E. Gas Engine Sets, 5-25 Kw.; 125-v.
NEW 1000 Gpm. Cent. Pump, 231 ft. head—
"STANDARD UNDERWRITERS"—Motor 440-v.
60 cy. 3-ph.
2—1000 Gpm. Underwriters Steam Pumps, 100 lb.

Send us inquiries for your wants

Ross Power Equipment Co.
Indianapolis, Ind.

Mine Cars, Rails and Ties

We have mine cars in stock for all purposes. Also rails 12 lb. to 100 lb. section. Spikes, bolts, frogs and switches. All trade is solicited and prices cheerfully quoted.

M. K. FRANK
Frick Building Pittsburgh, Pa.

FOR SALE

Two Adamson Locomotive attachments for Fordson Tractor, 36-in. gauge; one has never been used and the other has seen about six months' service and is equipped with the Fordson. Priced to sell as have finished this work.

A. J. Harbers, Columbus, Texas

For Sale

1 Williams Porto Crane, Steam 7x10 engine, traction wheels, 30 ft. boom, ¾ cubic yard bucket. Used two years. In excellent condition.

Eau Claire Sand & Gravel Co.
Eau Claire, Wis.

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If you are in the market for any kind of machinery, equipment or supplies, or if you desire catalogs, information or prices on any product, we are at your service—to obtain for you, without expense, catalogs, prices or specific information on every kind of machinery, equipment and supplies—or to help you find the hard to find source of supply.

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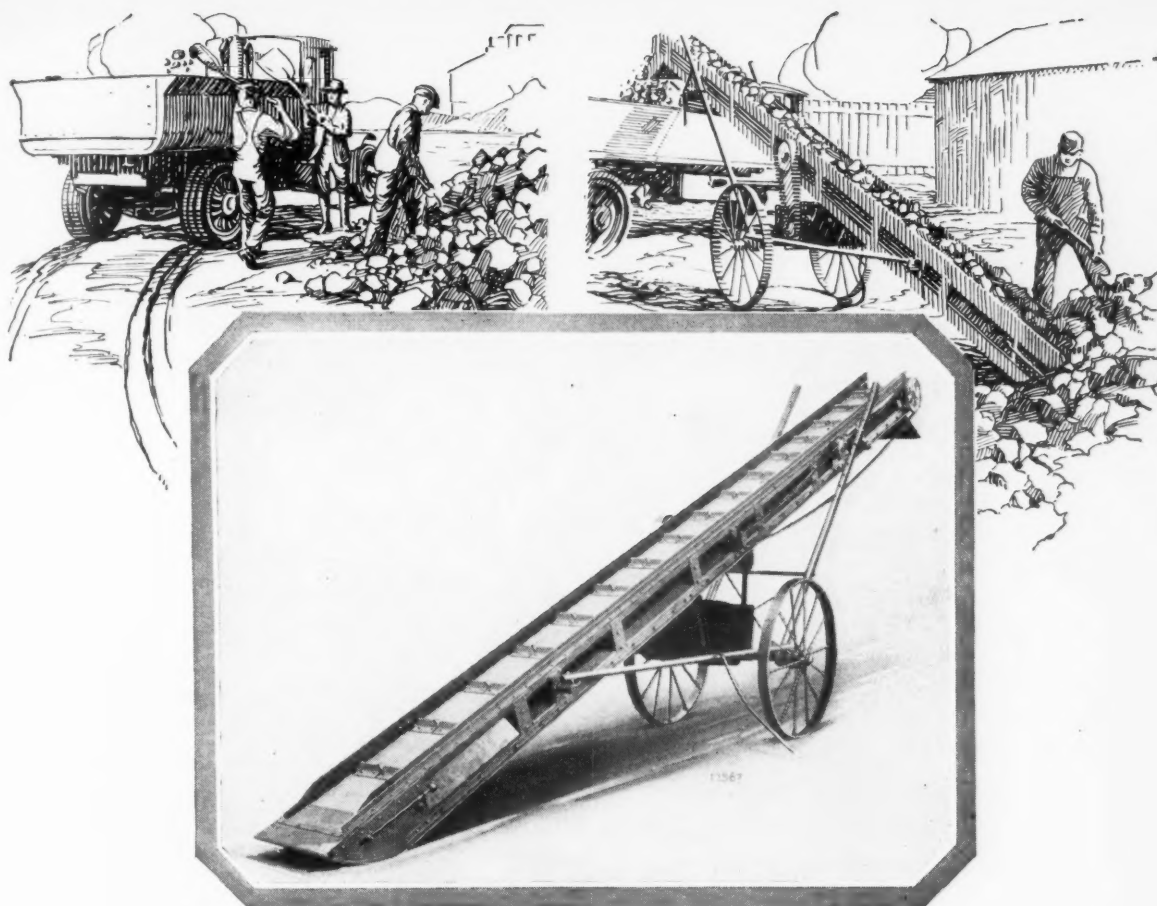
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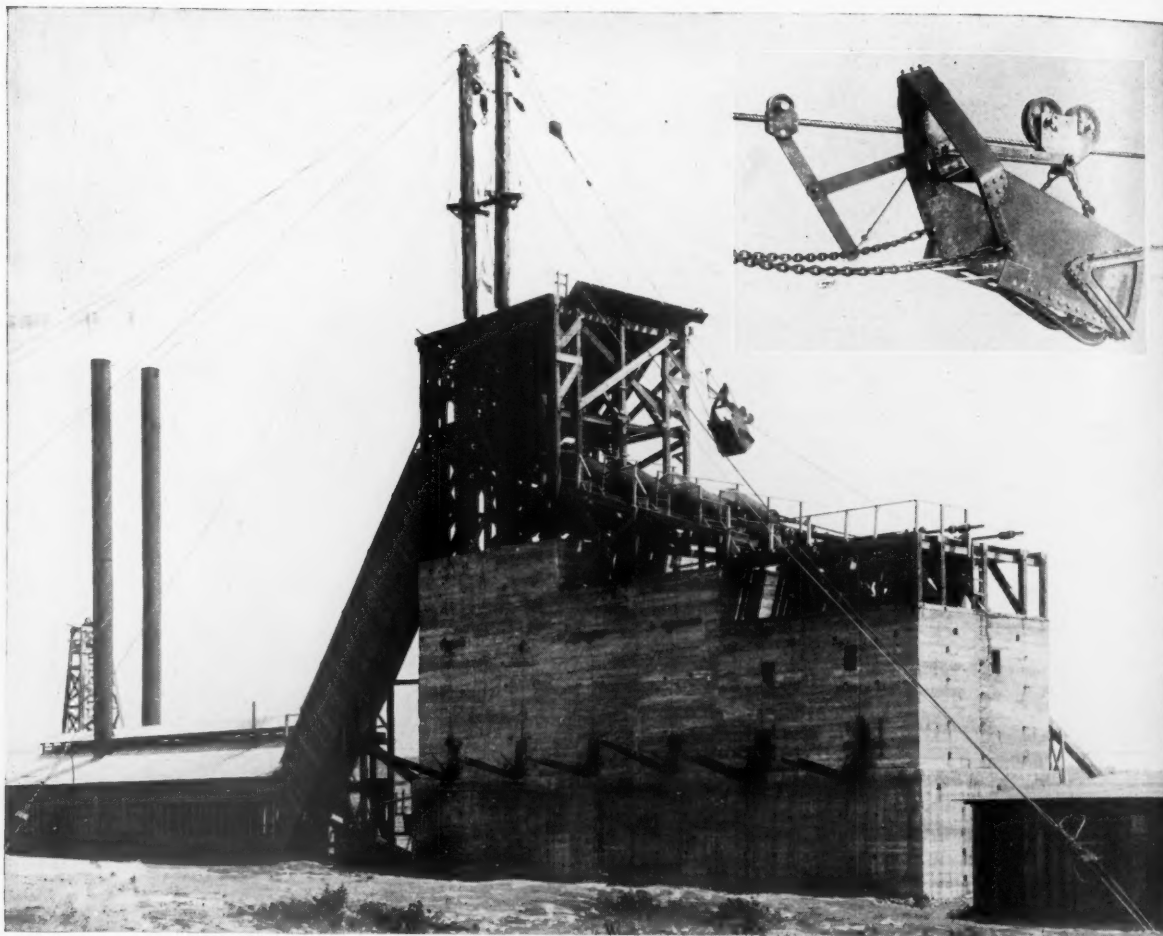
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With the increasing cost and difficulty in getting labor the money-saving possibilities of a Brownhoist are worthy of your careful study. Write for a copy of catalog K and let us go into your problem with you.

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The Only Journal With a Paid Circulation in the Rock Products Industry

Rock Products

Entered as second-class matter, July 2, 1907, at the Chicago, Illinois, Postoffice, under the Act of March 3, 1879.

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April 21, 1923

Number 8

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Part I—Outline of a series of forthcoming articles—Discovery of lime and process of manufacture.

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Now owns two Iowa mills, property in Texas and Ohio, and will soon have mills in the East and California.

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Floating men undesirable. Steady men can be had by providing homes and showing interest in them.

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Unusual layout of plant which provides simple setting for kilns; burn anthracite.

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MOBILITY



“—as per your specifications”

If you could write your own shovel specifications undoubtedly they would include greater simplicity, greater speed, greater capacity, greater mobility and, as a result, greater economy—the very qualities that have brought the Northwest Crawler Gas Shovel into so much prominence for quarry service in such a remarkably short time.

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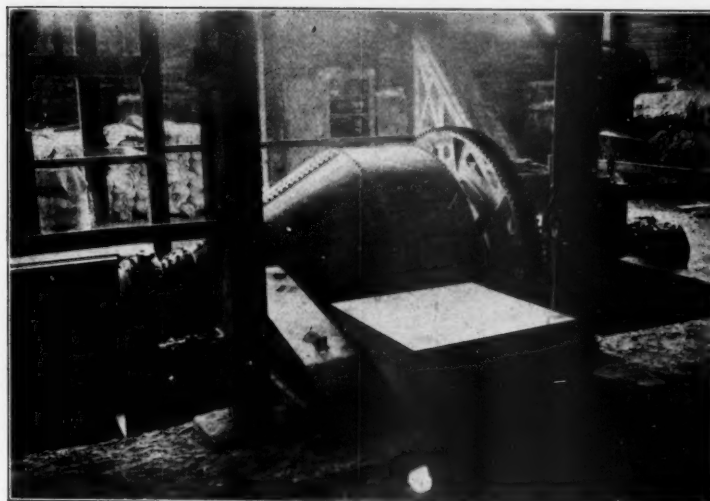
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Write for a copy of the specifications—see that they are specifications such as you would write yourself.

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GAS SHOVEL

**CRANE
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PULVERIZING SILICA

In a Slow Speed Mill

The highest grade of Silica from North Carolina is pulverized in the Hardinge Conical Mill. The product is pure and of uniform fineness.

If you have a problem of grinding any hard or abrasive material, the results of grinding this hard silica will give you an idea of what can be accomplished. This is what the Oliver Quartz is doing.

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R. P. M. of Mill	30
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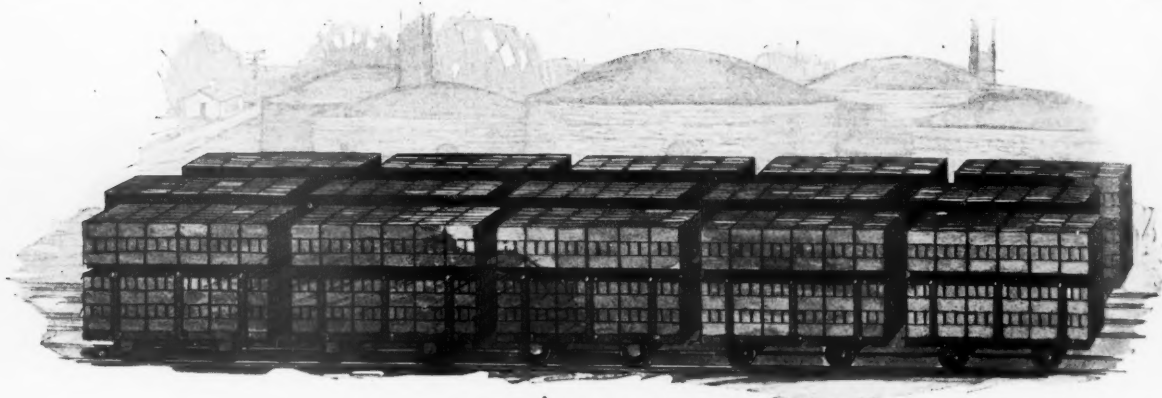
Our latest system enables the operator to adjust the fineness to as high as 99.8% passing 200 mesh if required.

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Because of their profitable performance, hundreds of HUM-MER units have been installed and are in use in the clay industry alone.

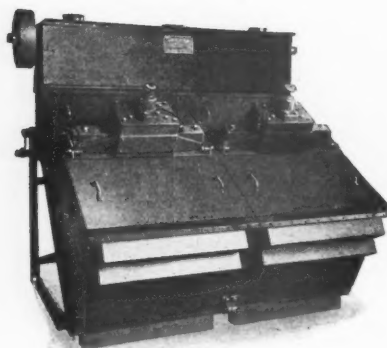
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Manufacturers of Woven Wire Screens and Screening Equipment



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Type 31
 6-Foot, Two Surface
 HUM-MER Electric Screen

RESULTS

of the Steam Shovel Upkeep Cost Prize Contest

Entries to the ERIE Steam Shovel Upkeep Cost Prize Contest have now been given their final rating by the judges. It was anything but easy to select the winners, as more than 300 concerns entered their records in the contest.

The Board of Judges consisted of ARTHUR S. BENT, Bent Bros., Los Angeles, Calif., pioneer contractors on large hydroelectric and irrigation projects construction, and 1922 President of the Associated General Contractors of America; HALBERT P. GILLETTE, Editor of "Engineering & Contracting" magazine, author of "Handbook of Cost Data," "Earth Work and Its Costs," and many other Engineering works; ARTHUR C. VICARY, Vice President of the Erie Steam Shovel Company, mechanical engineer with many years of specialized experience on steam shovel work.

The FIRST TWENTY awards

1. HERMAN HUEBSCHER, General Contractor, St. Paul, Minn. \$100.00 and a solid gold watch, 17-jewel Waltham movement.
2. A. B. COX, Asst. General Manager OLIVE BRANCH NOVACULITE CO., Olive Branch, Ill. \$50.00 and a solid gold watch, 17-jewel Waltham movement.
3. F. J. CHAPLIN, W. A. GOULD & BRO., Brinsin, Pa., \$25.00 and a solid gold watch, 15-jewel Waltham movement.
4. D. J. HARRY WEBB, Vice-Pres. & Gen. Mgr., CONNECTICUT NATIONAL PAVEMENTS, INC., New Haven, Conn. \$20.00 Prize.
5. E. B. PENDLETON, Supt. of Highways, COUNTY OF CHENANGO, Norwich, N. Y. \$15.00 Prize.
6. A. E. BAGNALL, Plant Mgr., FULLERS EARTH CO., Midway, Fla. \$10.00 Prize.
7. J. S. MORRISON, Mgr., JONESBORO GRAVEL CO., Dee, Ark. \$10.00 Prize.
8. H. L. CLARK, Clerk of Board of Highway Commissioners, HAMILTON COUNTY, TENN. \$10.00 Prize.
9. BERT R. HARTFORD, MAINE CRUSHED ROCK & GRAVEL CO., Portland, Me. \$10.00 Prize.
10. WM. GRAHAM, Contractor, Detroit, Michigan. \$10.00 Prize.
11. F. E. GLACE, W. P. McDONALD CONSTRUCTION CO., New York City, \$5.00 Prize.
12. JULIUS PORATH, Contractor, Detroit, Michigan. \$5.00 Prize.
13. C. A. SCHODORF, W. E. CALLAHAN CONSTR. CO., Columbus, Ohio. \$5.00 Prize.
14. H. M. ROBINSON, GAY & HAYS, Greensburgh, Pa. \$5.00 Prize.
15. H. C. BROWN, Supt., CUMBERLAND SAND CO., Cumberland, Md. \$5.00 Prize.
16. H. A. RIDENOUR, WIGGIM CRUSHED STONE & SAND CO., Germantown, Ohio. \$5.00 Prize.
17. LOUIS KAHLE, G. H. HEFFNER & SON, Celina, Ohio. \$5.00 Prize.
18. OLIVER FROMAN, VIELHAUER COAL CO., Dover, Ohio. \$5.00 Prize.
19. GEORGE HOPPLE, Mill & Plant Mgr., PENN PRODUCTS CO., Dillsburg, Pa. \$5.00 Prize.
20. JOS. A. MCKAY, JAMES A. MCKAY & SON, Detroit, Mich. \$5.00 Prize.

—Also "Honorable Mention" awards to many entries which were almost as good as the first 20. These will be published with the other in the Upkeep Cost Record Book. The sender of each "Honorable Mention" record receives a \$5.00 prize.

OUR SINCERE THANKS—to every one of the more than 300 concerns who added to the interest of this contest by sending in their records.

Methods used by the Judges in reaching their decisions are fully explained in the Upkeep Cost Record Book, now being printed. This book will give the individual records, also some very interesting averages. For instance there will be a summary for the shovels on earth excavation, another for rock work, etc.

A copy of this book will be sent, on request, to anyone who does excavation or construction work. Please send your request promptly, so that we can print enough copies to meet the demand.

ERIE STEAM SHOVEL CO., Erie Pa., U. S. A.

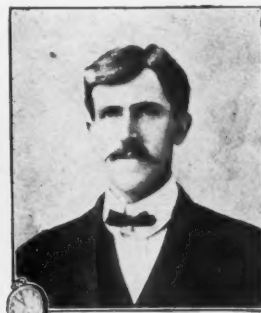
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Herman Huebscher, St. Paul, Minn., winner of first prize.



F. J. Chaplin, W. A. Gould & Bro., Brinsin, Pa., winner of third prize.



D. J. Harry Webb, Connecticut National Pavements, Inc., New Haven, Conn., winner of fourth prize.



E. B. Pendleton, Supt. Highways, Chenango County, New York, winner of fifth prize.



A. E. Bagnall, Fullers Earth Co., Midway, Fla., winner of sixth prize.



J. S. Morrison, Jonesboro Gravel Co., Dee, Ark., winner of seventh prize.



F. E. Glace, W. P. McDonald Construction Co., New York City, winner of eleventh prize.



Julius Porath, Detroit, Mich., the winner of twelfth prize.

ERIE Steam Shovel Co., Erie, Pa.

Gentlemen:

As soon as your printer completes the "Upkeep Cost Record Book" please send me one.

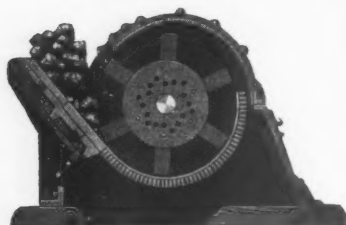
Name _____

Address _____

We use (steam shovels) (cranes) for the following classes of work:

Mail this coupon, and a copy of the book will be sent to you as soon as received from the printer.

The "Upkeep Cost Record Book" will give full details of many actual steam shovel records. Also gives the averages of a number of machines on the same class of work. It settles the question of "How much does it cost to keep up a well-built shovel that receives good care?"



X-Ray View of Williams Hinged Hammer Principle

"Jumbo crusher reducing 12 to 15 tons of 60 pound to 100 pound limestone to agricultural size in one operation. Has operated 2 years with no repair expense."

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"Williams crusher doing all and more than you guaranteed. We are handling one man stone and reduce to agricultural size in one operation."
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Crushes One Man Limestone to Agricultural Size in One Reduction

The unequalled demand for agricultural limestone now offers excellent opportunities for the profitable production of this material.

Mr. Otto Orth, the owner of the above installation, says: "Paid for itself in 4 months." Guaranteed to crush 10 tons per hour, it is actually reducing 12 to 15 tons and the machine has cost nothing for repairs in 2 years' operation.

Williams Jumbo Crushers are unequalled for this work as they crush stone up to 14" to agricultural size in one operation and make unnecessary the expense of a pulverizer. It is also adjustable to make macadam; in fact, many operators swear by them. E. H. Bradbury, Kansas City, says: "Supplanted Jaw Crusher and Gyratory and product is superior."

If you have rock to crush—any size to any fineness—write for Williams service records.

Williams Patent Crusher & Pulverizer Co.

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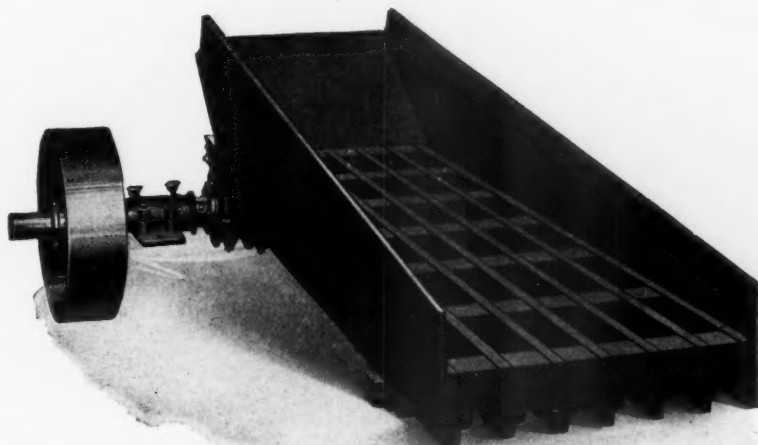
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The large breaker, as well as the small one will, however, lack in efficiency due to these causes, because installation of a larger machine usually means a heavier shovel,

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All crushers need a feeder for efficient and economical operation, and of all types for heavy duty, the best one to use is the BULLDOG.

The selective and regulating action of this feeder, by delivering a constant quantity of rock to the crusher, positively guarantees continuous production

It Keeps Your Crusher's Digestion Right

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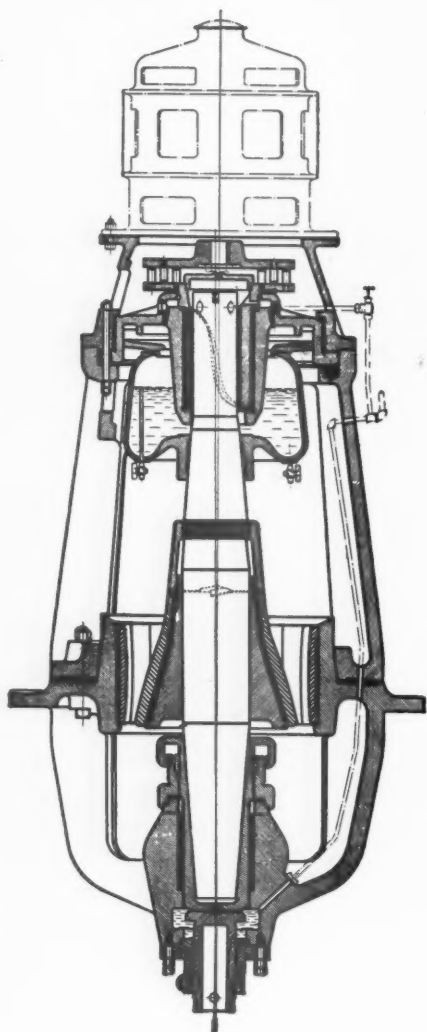
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Developed in a Granite Crushing Plant

This machine fills the need for a secondary crusher of large capacity and great strength for work in all friable rock.

The first machine, installed more than two years ago, has established remarkable records for capacity, low power consumption and general economy in operation. Later installations have more than proved all claims for the machine.

The construction is all-steel with Chrome-Vanadium forged steel shaft of large size, and with full-bearing eccentric, bronze bushed inside and out.

The entire machine is arranged to give freedom from costly delays. Positive lubrication without pumps—Dust prevention in bearings—Greater wear on manganese before replacement—Ease of adjustment and repair—and a sturdy oversize motor—All work to your advantage.

Crusher is simple in design and the best practice in modern Engineering is utilized.

Built in six standard sizes to follow any primary, smallest machine can be set to $\frac{1}{2}$ " with large capacity.

Arranged for direct motor, or belt drive.

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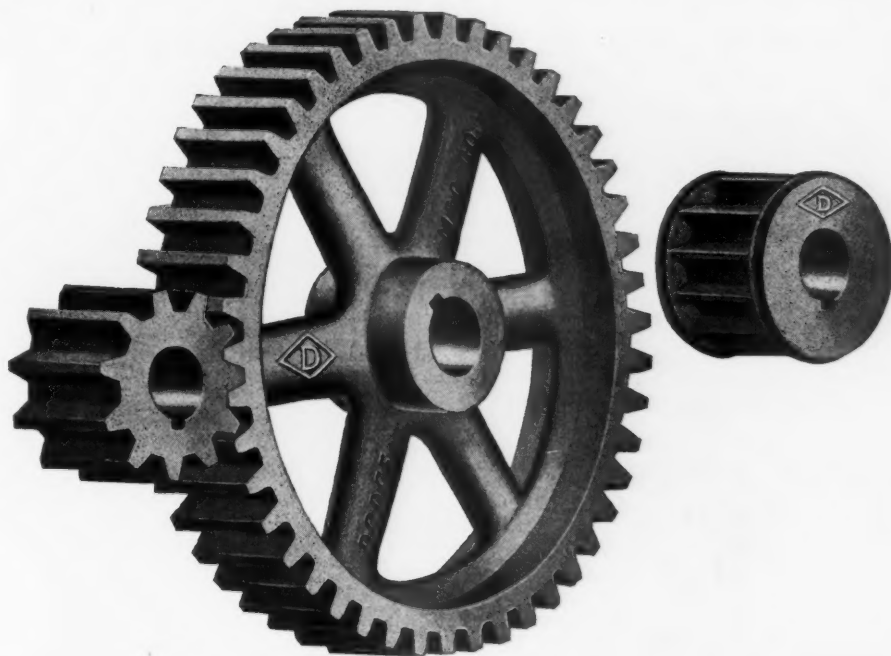
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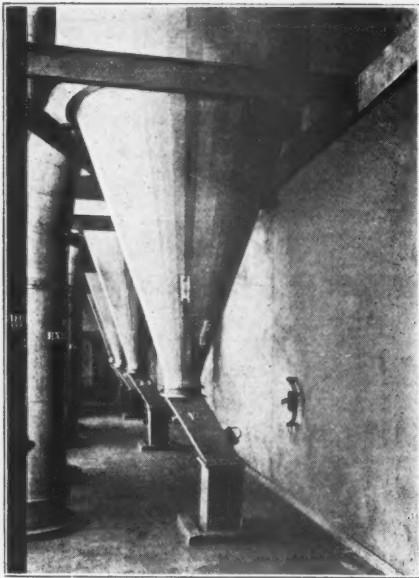
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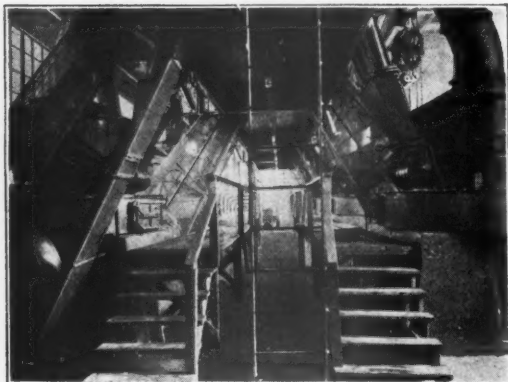
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The Record of Raymond Roller Mills Grinding Coal in This Plant Speaks for Itself

Initial four Mills installed July, 1920.

Two added June, 1922.

Two more added January, 1923.

And—Two more will be installed in a Cement Plant being built by this Company now.

Raymond Roller Mills for powdering Coal require less power, less maintenance and less labor attendance than any other machines ever used for this purpose.

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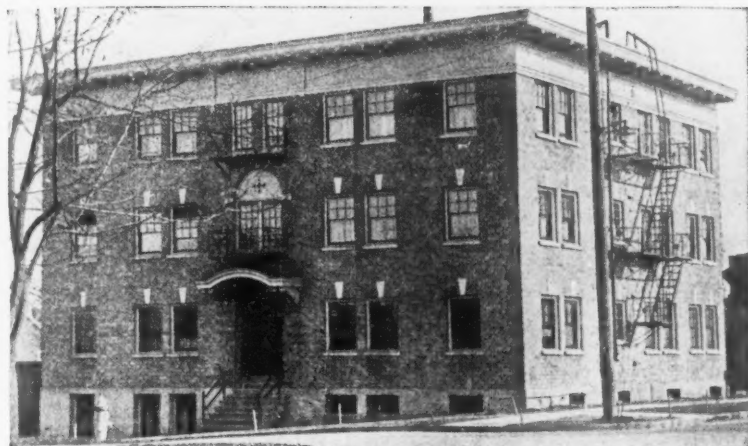
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This demonstrates bonding of SHOPE BRICK with the mortar, also fire resisting and easy cleaning qualities

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Dear Sir:

In reply to your request for a statement as to the condition of my building after the fire. I am pleased to state that the brick work was left practically intact, which to my mind was remarkable considering the fact that the building was a frame structure with a brick veneer. The two upper floors and the roof were burned out, also parts of the other floors next to the fire.

The south side of the building, which was exposed to terrific heat by the explosion of a large tank of gasoline, I plastered rather than attempting to clean the brick. There was one small hole poked through on this side by the police in an attempt to push the wall in.

The building is now rebuilt and has the same external appearance as before the fire. I am pleased with the Shope Brick and shall use them in any future building.

Very truly yours,
(Signed) A. J. Gustaveson, Owner.
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We sell Shope Patented Machinery to only one manufacturer in a territory. Write today for catalogue and information on your territory.

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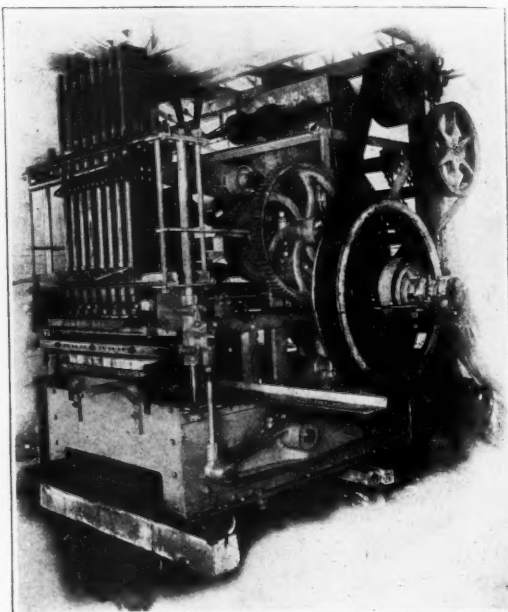
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